

COAL AGE

Vol. 3

NEW YORK, MARCH 8, 1913

No. 10

"PRECEDENT" forms a comfortable wall for people to lean against. However, the fellow who wants to remain in a standing position needs only to keep his fingers on the railing of "ingenuity" that persistently winds about on the other side of the street.

We make no claim for originality of thought in the above. Sidney Smith hinted the same thing in an essay published in 1824, and, for all we know to the contrary, he may have but voiced the thought of someone who lived a century or two before. Close observation will show that some of our mining folk haven't discovered that there is anything of value above, below or across from the "wall of precedent," even though Smith has been dead "Lo these many years."

For the benefit of all who may be willing to class themselves with the last described, we wish to relate, in part, the experiences of a young fellow who followed the "ingenuity" route regardless of "precedent."

This man was superintendent of a group of mines that supplied coking coal to a blast-furnace plant. The capacity of his mines was such that under normal conditions the requirements of the furnaces were easily met, but during the months of December and January, when the holiday spirit took possession of his men, it was necessary to feed the furnaces largely from stock piles.

Occasionally strikes at the mines compelled the furnaces to draw from the stock piles at other times than Christmas, and during such years the holiday shortage had to be met by buying coke in the open market. Coke bought in this way and at such a time was always high in price and generally inferior in quality. This was especially true following a general strike covering all mines in a district, for in that event the only available source of supply must needs be at a great distance.

Now to return to the fellow who is to furnish the ingenuity lesson. One bright Thanksgiving morn he found himself facing an almost exhausted stock pile of coke and a group of miners longing for a good old-fashioned Christmas drunk. "Precedent" put the responsibility on the shoulders of his manager, since a general strike that affected all mines in the state early in the previous summer was responsible for the meager stock pile.

But the manager was not required to feel the responsibility this time. The superintendent decided that he would try to make his miners forget their annual holiday drunk until Christmas Day at least, and this is how he went about it: He posted a notice stating that all miners who worked every day during the month of December up to the 25th would be presented with a large live turkey on Christmas morning. Of course, he did not know how successful he would be, since "precedent," so far as he could learn, furnished no clue.

As a matter of record here is what happened: His December output exceeded that of any previous month during the year, nearly every man earned a turkey and the company earned the goodwill of the miners. Last, but not least, the meager stock pile remained intact during the holidays, notwithstanding the fact that no coke was purchased from outside companies.

The giving of bonuses or prizes has been successfully employed in many industries for years, but examples in the coal industry are rare. A little ingenuity would suggest numerous possibilities.

There is also a broader aspect to such ingenuity that should appeal to anyone who is ambitious to accomplish things which may be of benefit to the many. *Each innovation carried to a successful conclusion becomes in turn a precedent, which even the most timid may follow unhesitatingly.*

IDEAS AND SUGGESTIONS

Cheer Up

BY J. E. JONES*

Centuries upon centuries ago mankind was taught that kind answers would turn away wrath, and a pleasing countenance was better than the possession of gold and silver. And down through the ages, wise men have endeavored to drive these lessons home. But with all of this teaching and our twentieth-century advancement, we are not exceptionally cheerful, nor are we adepts in giving kind answers at critical moments.

Good cheer is not out of place wherever people are associated. Especially is this true in connection with coal mining. The darkness of the mine, the absence of sunlight, the nature of the work and the generally austere bearing of those in authority are a few of the many things that tend to make the average mineworker despondent, cranky and suspicious. But, because of these unfavorable surroundings, the mining industry offers an excellent opportunity for the practice of lessons in "good cheer."

From general manager to trapper boy there is nothing more contagious than cheerfulness. In a brief period of time, it finds its way throughout the mine. Men seem to catch it and their work is lightened, the day made shorter and all go home to enjoy a good night's rest after a prosperous day's work. Even the mules and machinery are benefited, for the work has been accomplished in shorter time and with fewer mishaps when men keep their temper throughout the day.

Good cheer is as essential to the most successful management of a mine as is the good will of the men. To a great extent, these go hand in hand. Other things being equal, a cheerful mine manager will get better results than one who is gruff. Bosses who are able to maintain an earnest, cheerful manner when discussing the faults of men are infinitely more successful than those who are severe in correcting a fault, and leave a bad impression in the minds of workmen in their charge.

The best results are obtained when men perform their work with a hearty good will, and have a pride in the finished job. This sort of workmanship and a cranky boss are seldom found together. Men at best are but grownup children. They are affected nearly if not quite as much by their emotions and the emotions of others. It takes but little more time for a manager or boss to speak cheerfully for a minute or two to men as he travels through the mine. Men often carry to work burdens that a cheerful word will make lighter. It is a simple matter to inquire as to the welfare of a sick child, or speak approvingly of improvements noticed on the house or in the garden at the home of the workman, or ask about the baby and the mother.

Any manager with a little tact and ability to read human nature can, with sincerity and cheerfulness, make a big advancement in the building up of a strong organ-

ization. Since the work of the coal producer is at best somewhat unpleasant, the least that men in authority can do is to strive to let in a little of God's sunlight into their lives, and make living for them more worthwhile, and by so doing the world will be brighter and life happier; therefore, CHEER UP.

✻

Handling Men

BY FRANK SELBE*

The ability to handle men seems to be one of the chief points in being a successful mine foreman. I have heard this preached since I was a trapper, and while it is undoubtedly true to a certain extent, still I do not believe it to be the most important point. I think, among the qualifications of a successful foreman, the first to be considered is his knowledge of mining operations and methods.

The term "handling men" has more than one meaning. First is the placing of men to obtain the best results from their labor, and to insure their own satisfaction. Next comes the problem of handling them in time of disputes, strikes or other labor troubles. This is a big question in itself and often time can be saved (and time is money) by the exercise of a little judgment and forethought.

A great deal of trouble is often caused over the most trifling matters. For instance, a miner finds some unusual impurities in the seam, something from which it is almost impossible to free the coal and he is then docked. He sends for the mine foreman to examine it and tell him what to do. The foreman sends word that he is well acquainted with conditions and there is nothing for him to do but clean the coal. It may be that the mine foreman has not been in this miner's place for a week, and the latter, feeling that an injustice is being done him, goes with his complaint to the company, with the result that trouble usually follows.

In another instance, one miner sees a fellow-workman bringing his boy, who is under age, according to the state laws, to the mine. He reports the case to the pit-boss, who informs him that: "I am carrying the time-book here and if I need any assistance, I will call on you." It would have been much better had the foreman used a bit of tact and replied: "I will look into the matter—am very glad you mentioned it."

It seems to me that the average mine foreman is too self-important. He quite often resembles Simon Legree—very knowing and important until the superintendent arrives on the scene, when he becomes as meek as a lamb. And not infrequently he is guilty of shifting the blame for mistakes on someone else. The best of men make mistakes and they should have no hesitancy in acknowledging them. It has been wisely said that: "The man who never made a mistake, never made anything."

*Muleboss, Dering No. 2, Danville, Ill.

*Elkridge, W. Va.

Generally, the mine foreman who finds the most fault is the one who ignorantly, but effectively, multiplies the evils, and he often convicts himself while trying to convict someone else. Of course, the foreman has some difficult problems to solve, but if he will use good sense and judgment he will obtain better results.

Frequently he has a man to contend with who is as bullheaded as himself. Such a one, having his own ideas of right and wrong (nearly always wrong), may destroy the peace and contentment of others who are perfectly satisfied. He also has some men who are never satisfied—men who are always on his trail, wanting to change places, extra pay for everything they do, and so on. There is also the man who is always trying to make trouble. He thinks he is the right party to lead the men to victory, when he is simply a black sheep, and the best thing for all concerned is to weed him out.

❖

Modernizing Mine Management

BY A COLORADO ENGINEER

The dictionary defines a manager as "One who conducts business or other affairs skillfully and with frugality and economy; an economist." But, in coal mining, many factors complicate the duties of a successful manager. Competition in trade, the increased difficulty in the recovery of coal owing to the exhaustion of the seam, the increasing demand for greater safety and the exacting requirements of large consumers of coal, together with the demand for increased wages and reduction of hours on the part of the miner make it a practical impossibility for *one* man to successfully manage and harmonize these conflicting conditions. The demand is now that every personal unit in the organization be a manager *in fact*, to insure ultimate success.

To bring about this millennium requires an intense desire for the accomplishment of such a purpose, in the mind of the one high in authority, and an ability, on his part, to inspire confidence in his subordinates. Where a subordinate shows a tendency to be stubborn someone must be appointed to take his place, and the choice is preferably of one within the organization. Such change is necessary for proper discipline. The manager must study, standardize, instruct, condemn and reward, using always his best tact and judgment.

Much of the expense of operation, in coal mining, occurs at the working face. Where machines are used in mining the coal, there is great need to study carefully the conditions here, so as to expedite the work of cutting and loading the coal and harmonize the movements of the machine man and his helper, and those whose duty it is to blast and load the coal.

Much delay is often experienced when starting to cut in the morning and when moving the machine from room to room, in the unloading of tools, and setting of anchors or jacks and other details. A careful study is often necessary to determine the exact cause of such delay. The fault may not rest wholly on the man in charge of the machine. The mine electrician may have failed to make the necessary repairs reported the previous day, or the cause may be a faulty installation or equipment.

A careful study of all these conditions should result in ascertaining data by which it is possible to set a standard time for each operation, barring, of course, unfore-

seen accidents. The coöperation of every man on the job is necessary to do this. In this respect the workmen themselves become undermanagers. They study to conduct their business "with frugality and economy."

The work of the manager is thus, not only lightened, but made more efficient. Difficulty is sometimes met when the work is done on contract; especially if the conditions are such that the man is not interested in increasing his rate of cutting in order to expedite other work in the mine. If he is working at a certain rate per day, he must be assured that an increased rate of cutting will materially increase his wage.

It is, of course, impossible for wages to increase in the same ratio with the increased efficiency of workmen. Men are generally fair as a whole, if they are not as individuals. A workman who increases his efficiency twofold will seldom demand twice his former pay. In this regard experience teaches that a word of encouragement often works wonders that money cannot accomplish.

In seeking to better the management of a coal mine, every improvement in design of equipment, every successful attempt to increase the efficiency of workmen, is a step in the ultimate increase of efficiency.

A growing feature of the new management, in coal mining, is the desire shown to provide for those on whom the industry depends, giving to them comfortable places in which to live, providing suitable amusement and education for them and their families and encouraging thrift in the community of workers. By this means each worker is stimulated to do his best.

❖

The Trapper's Swagger,

BY J. R. ALLARDYCE

(Written expressly for Coal Age.)

"When I'm a man," quoth the ancient kid
That sits by the third west door,
"I'll show some guys in this mine, what's what,"
And he spat through his teeth and swore.

"There's Yankem Jones—the son of a gun!—
I'd give that jay a rope."
He swallowed a chew and missed his sprags,
And killed mule Dick on the slope.

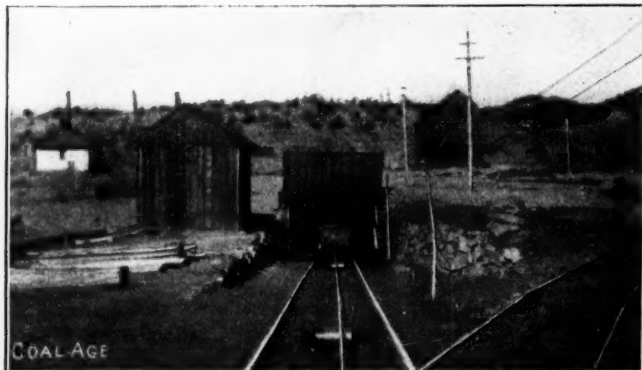
"And Balky Pete," says he, as he stuffed
Some "long-cut" into his cheek;
"He cracks his whip like a man, but—huh!—
He couldn't drive cows to the creek."

"And that Red Jack that swipes my oil,
And dopes my dinner tea;
He sleeps on the trip—the roundhead dub,
I'm in training for him," says he.

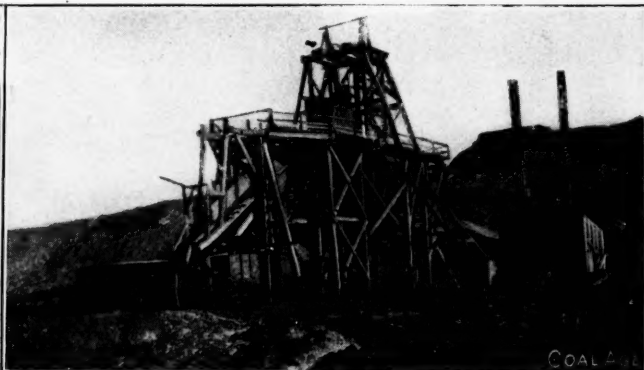
"And that old guy with the fringe on his chin—
Sam Sears—he thinks he's It;
He bosses me 'round like a blooming slave,
But now he has got to quit."

And he clenched his fist, and he felt his arm
Where the muscle ought to be;
And puffed himself up and smote his chest—
"Oh! I'll soon be a man," says he.

SNAP SHOTS IN COAL MINING



MOUTH OF SLOPE AT HEATON MINE OF VICTOR AMERICAN FUEL Co., HEATON, N. M.



BARTLETT SHAFT AT MINE OF VICTOR AMERICAN FUEL Co., GIBSON, N. M.



TIPPLE AND POWER HOUSE OF ELKINS COAL & COKE Co., BRETZ, W. VA.



NO. 2 MINE OF DOMINION COAL Co., CAPE BRETON, N. S.



HONEYBROOK STRIPPINGS AT MCADOO, PENN. NOTE FOLDS IN THE COAL

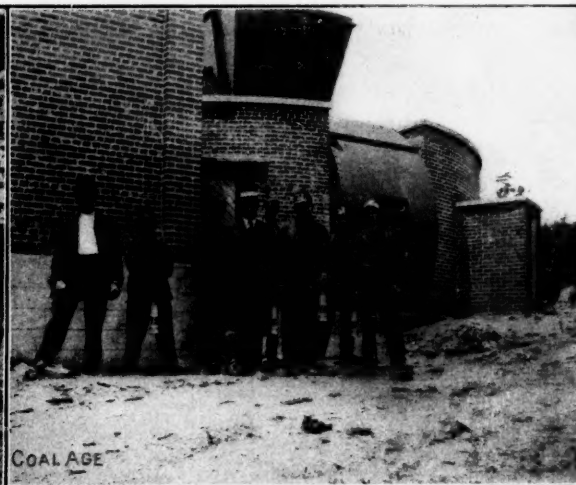
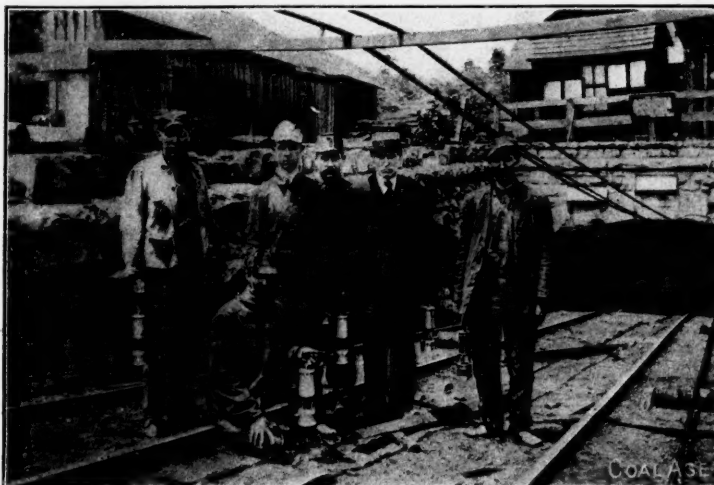


ANOTHER VIEW OF THE ANTHRACITE STRIPPINGS AT MCADOO, PENN.



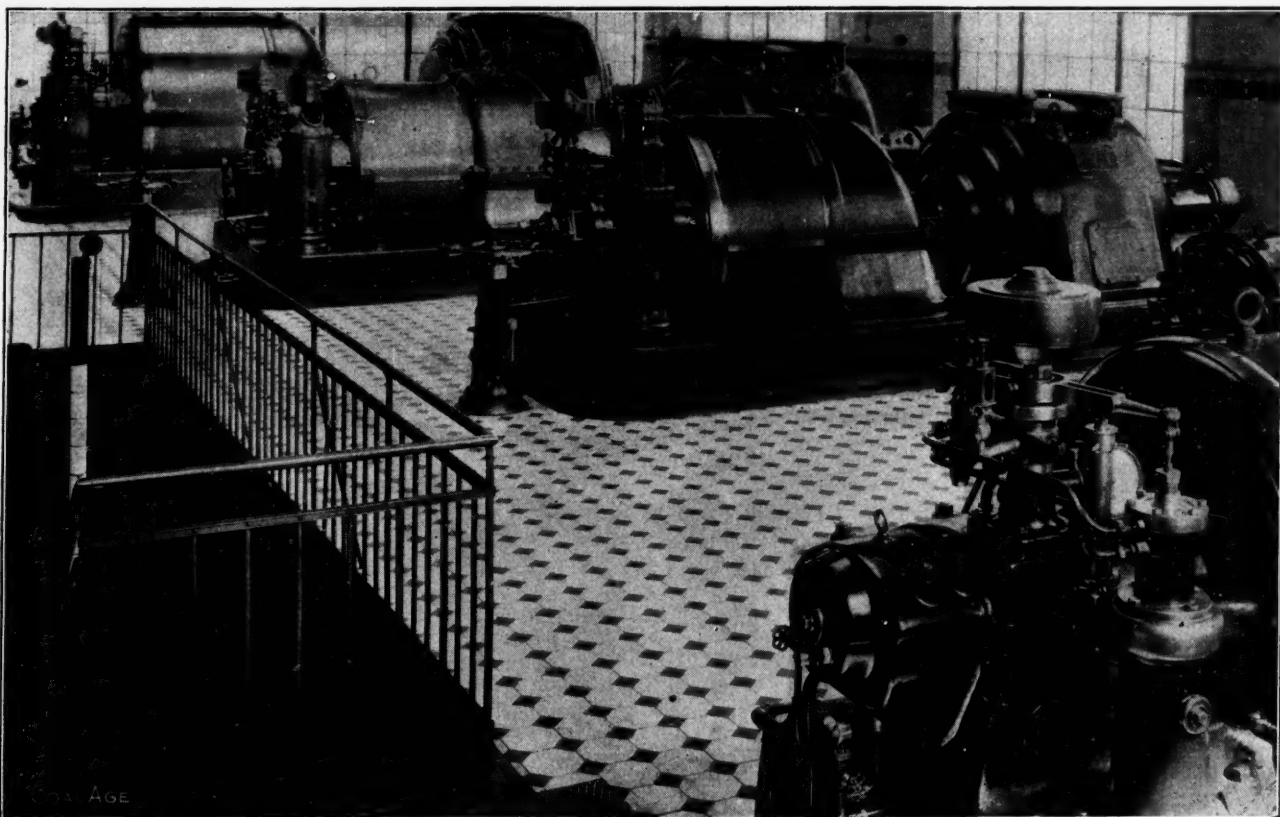
COKE PLANT, UTAH FUEL CO., SUNNYSIDE, UTAH.
PHOTOS TAKEN ON AN IDLE SUNDAY

SHAFT NO. 1, KENTUCKY MIDLAND COAL CO., MIDLAND,
MUHLENBURG COUNTY, KY.



GROUP OF FIREBOSSSES, ALL OF WHOM ARE COAL AGE
READERS. OREND A MINE, BOSWELL PENN.

SHOWING SUBSTANTIAL BRICK FAN HOUSING AT
THE OREND A MINE, BOSWELL, PENN.



5000-KW. STEAM TURBINE PLANT OF KRAFTZENTRALE ROSENTHAL, AT ROSENTHAL, NEAR BERLIN, GERMANY

Our Future in the Export Trade—III

BY F. R. WADLEIGH*

SYNOPSIS—The third and concluding article on this subject. This installment discusses the monetary value of different export coals of the world, and gives a careful analytical comparison. The question of transportation to the loading ports is also discussed in detail.

✱

As already noted in a previous issue, the average railroad haul of Welsh coal is about 20 miles; for this distance the maximum rate chargeable is 1.75c. per ton-mile; a rebate of about 35% is allowed on coal for export. For instance, the rate from mines to Cardiff is 33.3c. for export and 46.3c. for local use. It might also be stated here that both the French and German railroads give special rates on coal for export. The following table shows the market value of the different British coals as of July 1, 1912:

TABLE I. COMPARATIVE VALUE OF VARIOUS ENGLISH COALS
South Wales (F.o.b. Cardiff) Monmouthshire

Best Admiralty large.....	\$4.08@4.26	Best Black Vein.....	\$3.65@3.77
Admiralty seconds.....	3.65@3.90	No. 3 Rhondda, large.....	3.90@4.14
Large ordinaries.....	3.53@3.65	No. 3 Rhondda, smalls.....	2.92@3.04
Large best drys.....	4.02@4.14	No. 2 Rhondda, large.....	2.92@3.04
Best smalls (bunkers).....	2.43@2.56	No. 2 Rhondda, smalls.....	2.07@2.19
Cargo smalls.....	2.13@2.25	Patent fuel (briquettes).....	4.39@4.62
		Special foundry coke.....	6.57@6.82
		Furnace coke.....	4.62@4.87
Newcastle coals, (F.o.b. Tyne)		Scotch Coals	
Blyth best steams.....	\$3.10@3.17	Scotch ell coals, f.o.b.	
Blyth ordinary steam.....	2.43@2.56	Glasgow.....	2.56@2.70
Blyth best smalls.....	2.13@2.19	Scotch steam coals, f.o.b.	
Tyne prime steams.....	2.92	Glasgow.....	2.56@2.68
Tyne second.....	2.62@2.68	Scotch splint coals, f.o.b.	
Tyne best smalls.....	2.31@2.37	Glasgow.....	2.74@2.86
Northumberland un-		Fife steam coals, f.o.b.	
screened.....	2.31@2.43	Methil.....	2.92@3.04
Northumberland ordinary		Fife treble nuts, f.o.b.	
bunkers.....	2.31@2.43	Methil.....	2.56@2.58
Good Durham bunkers.....	2.49@2.68		
Wear gas coal.....	3.29		
Durham gas coal.....	3.20		

In making any comparison between the coals of the United States and Welsh product, we should first have a clear understanding as to the names and quality of the different grades in question, as well as the coal beds from which they are mined.

The United States fuels considered in this comparison are those known under the trade names of Pocahontas and New River. Both of these come from what is called by the state and U. S. Geological Surveys, the New River-Pocahontas area of West Virginia; both are found in the same geological measures, known as the Pottsville Series, the Pocahontas coal from the Lower Group and the New River from the Middle Group. The estimated total area underlaid by these coals is about 1,648,000 acres, or about 9,888,000,000 tons of available coal.

POCAHONTAS COALS

About 90 per cent. of the Pocahontas coal is mined from the No. 3 Pocahontas bed, which is generally considered to be the standard. The coal from the upper thin beds is, as a whole, not equal in quality to that from the No. 3 bed, with the exception of the Davy-Sewell bed, which is correlated with the Sewell bed of the New River field proper. There is also a small tonnage of coal from the No. 4 Pocahontas bed that is quite equal in quality to much of that from the No. 3, but the amount is so small as to be negligible in this comparison.

The Pocahontas No. 3 bed has been under development since 1883, since which time to the close of 1910, 101,-

*Consulting engineer, 1013 Bank of Commerce Building, Norfolk, Va.

986,000 tons of coal and 25,000,000 tons of coke have been produced. This coal is probably the best known, especially in foreign countries of all American coals, due largely to its quality and to the intelligent manner in which it was put on the market and advertised by Messrs. Castner & Curran, who for many years were the exclusive sales agents for this coal. The foresight and sagacity of F. J. Kimball, former president of the Norfolk & Western Ry., on which line all of the Pocahontas mines are located, also had much to do with the rapid development of the field.

Area and Thickness—The No. 3 Pocahontas underlies a large area above water level, approximately 300 square miles. The thickness of the bed will run from 4½ to 12 ft., the average for the entire field being about 6½ feet.

Analyses—The following analyses are taken from the various publications of the U. S. Geological Survey, the U. S. Bureau of Mines and the West Virginia State Geological Survey. We also give analysis of a picked sample, made by J. & H. S. Pattinson, Newcastle, England, as showing the purity of the clean coal:

No. 1—Average of 205 mine samples, from 64 mines, U. S. Geological Survey, 1909.

No. 1a—The best single analysis from the ones averaged as No. 1 above.

No. 1b—The worst single analysis from the ones averaged as No. 1 above.

No. 2—Average of five mine samples from three mines, U. S. Geological Survey Bulletin 362.

No. 3—Average of four samples, actual shipment, U. S. Geological Survey Bulletin 362.

No. 4—Average of samples from 15 mines, West Virginia State Survey, 1911, Bulletin 2.

No. 5—Average of samples from 38 mines. West Virginia State Survey, 1908, Vol. II (A).

No. 6—Average of 407,326 tons, shipped to the Panama Canal, 1909-10, Bureau of Mines, Bulletin 41.

No. 6a—Best average of 5021 tons, shipped to the Panama Canal, 1909-10, U. S. Geological Survey.

No. 6b—Worst average of 5530 tons, shipped to the Panama Canal, 1909-10, U. S. Geological Survey.

No. 7—Average of 181,000 tons, shipped to the Panama Canal, 1908-09, U. S. Geological Survey, Bulletin 428.

No. 8—Analysis of samples from 100 tons shipped to the U. S. Navy and made into briquettes, 1907, Bulletin 362.

No. 9—Selected sample. Analysis by J. & H. S. Pattinson, Newcastle, England.

Norfolk & Western Ry.—All Pocahontas coal for ocean shipment is hauled to tidewater at Hampton Roads over this road; the average distance from the mines is 376 miles and the freight rate \$1.40 per gross ton, or 3.70 mills per ton-mile; the weight of a coal train hauled to the Lamberts Point terminal and piers with one locomotive is 4200 net tons. There are three piers at Lamberts Point for dumping coal into ships and the best record for one day's dumping was 26,851 tons. During year ending Mar. 31, 1912, 3,827,121 tons of coal were dumped at these piers. A contract has been let and

work begun on a new steel pier, 1200 ft. long and 90 ft. high, with an estimated capacity of 1700 tons per hour.

NEW RIVER COALS

There are three beds of coal in the New River field, Sewell, Fire Creek and Beckley, although there are never more than two of these of workable thickness in the same locality; the largest percentage of coal mined comes from the Sewell bed.

The heating value of the coal from each bed is practically the same and no distinction is made between them in shipping.

The field has been under development since 1873, and the coal has been used by the U. S. Navy since 1878; the output last year was 9,298,000 net tons.

No. 10—Average of samples from 11,700-ton cargo of U. S. Navy Collier "Cyclops," July 27, 1912, five mines represented.

No. 11—Analysis of sample from shipment of 100 tons—Babcock & Wilcox Boiler Co.

No. 12—Selected sample average of five analyses—J. W. Hill.

No. 13—Selected sample average of four analyses—J. W. Hill.

No. 14—Selected sample average of six analyses—J. & H. S. Pattinson.

New River coal is hauled over the Chesapeake & Ohio Ry. to Newport News and over the Virginian Ry. to Sewalls Point.

Chesapeake & Ohio R.R.—The average distance from

TABLE II. TYPICAL ANALYSES OF THE DIFFERENT GRADES OF POCAHONTAS COALS

	1a	1*	1b.	2†	3†	4*	5*	6a**	6**	6b	7†	8	9
Moisture.....	0.60	0.68	0.51	.....	.....	1.21	0.23	3.30	2.63	2.06	.....	.....	1.29
Volatile.....	16.00	14.29	13.76	17.07	16.275	15.66	17.47	17.79	18.25	17.12	.....	16.42	21.20
Fixed carbon.....	80.40	80.55	79.95	79.03	77.325	78.01	77.80	72.41	73.87	77.20	.....	79.13	78.80
Ash.....	3.02	4.48	5.78	3.90	6.40	5.12	4.50	5.50	5.25	3.62	5.97	4.45	1.54
Carbon.....	87.50	86.05	84.41	.....	84.68	84.76	.....	.....	.....	.....	.....	87.01	86.51
Hydrogen.....	4.71	4.46	4.24	.....	4.265	4.27	.....	.....	.....	.....	.....	4.28	4.44
Oxygen.....	2.92	3.27	3.99	.....	3.045	4.22	.....	.....	.....	.....	.....	2.72	4.95
Nitrogen.....	1.20	1.14	1.14	.....	1.01	0.94	.....	.....	.....	.....	.....	1.00	0.56
Sulphur.....	0.65	0.62	0.44	0.56	0.53	0.69	0.62	0.75	0.64	0.66	.....	0.54	0.61
B.t.u.**	15,350	15,008	14,735	15,288	14,893	15,027	15,095	14,667†	14,921†	15,200	14,898	15,226	15,411

* Air dried. † Dry. ** As received.

Area and Thickness—The New River beds underlie approximately 1600 square miles. Their thickness is as follows: Sewell, from 3½ to 6 ft.; average, 4½ ft. Fire Creek, from 3½ to 6 ft.; average, 4½ ft. Beckley, from 4½ to 11 ft.; average, 5½ ft.

Analyses—The following analyses of New River coals are taken from various bulletins of the U. S. Geological Survey and the U. S. Bureau of Mines, in addition to which are given analyses of coals shipped to the United States Navy in 1911 and 1912. We also give an analysis made by the Babcock & Wilcox Boiler Co., of a sample from a shipment of 100 tons, the gross sample weighing 500 lb. While of no commercial value, but to show the great purity and value of the clean coal, analysis of three different carefully selected samples, two made by a well known authority, John W. Hill, of New York, and one by J. & H. S. Pattinson, Newcastle, England, are given.

No. 1—Average of 116 samples from 42 mines, U. S. Geological Survey, 1909.

No. 1a—The best of the above analyses.

No. 1b—The worst of the above analyses.

No. 2—Average of 16 samples from eight mines, U. S. Geological Survey, Bulletin 362, 1907.

No. 3—Average of 40 analyses from actual shipments, U. S. Geological Survey, Bulletins 362 and 23.

No. 4—Average of analyses of samples from 60 mines, West Virginia Geological Survey, Bulletin 2, 1911.

No. 5—Average of analyses of samples from 51 mines, West Virginia Geological Survey, Bulletin 2, 1911.

No. 6—Average of 115,000 tons shipped to Panama Canal, 1908-09, sold on a guarantee of 14,850 B.t.u. Reported by U. S. Geological Survey Bulletin 428.

No. 7—Average of 27 cargoes shipped to Panama Canal, sold on a guarantee of 14,850 B.t.u. Reported by U. S. Bureau of Mines.

No. 8—Average of 11 cargoes shipped U. S. Navy in 1911. Samples and analyses by U. S. inspector and chemists.

No. 9—Average of eight cargoes shipped U. S. Navy in 1912. Samples and analyses by U. S. inspector and chemists.

the mines to tidewater over this road is 418 miles and the freight rate is \$1.40 per gross ton or 3.34 mills per ton-mile; the weight of coal trains hauled into the Newport News terminal by one locomotive is 4200 tons. There are four piers or docks at this terminal for loading coal into ships and 31,565 tons is the largest dumping in one day. The quickest loading record was made by the S.S. "Berwindmoor," and was 8612 tons in 10½ hours.

The contract has been let and work begun on a new steel pier, 1200 ft. long, 90 ft. high and 67 ft. wide, with berths for four of the largest steamships and a dumping capacity of 3000 tons per hour.

During the first eight months of 1912, 689,767 tons of coal were shipped to foreign countries from Newport News.

Virginian Ry.—The average distance from the mines to tidewater on this road is 410 miles; the freight rate \$1.40 per gross ton or 3.41 mills per ton-mile, while the weight of coal trains hauled by one locomotive into their Sewalls Point terminal is 5000 tons. There is one steel pier for loading ships, 1045 ft. long, with 32 chutes on each side and a handling capacity of one 50-ton car every two minutes.

The largest dumping in one day at this pier was 29,558 tons, the actual working time being 18 hr. 30 min. The largest dumping in one hour was 1721 tons. The quickest loading record was made on the S.S. "Newton," and was 8427 tons in 5 hr. 15 minutes. During the eight months ending Aug. 31, 1912, 181,742 tons of coal were shipped to foreign ports from this terminal.

The Sewalls Point pier, probably the fastest coal dumping pier in the world, is 1045 ft. long, 76 ft. high and 65 ft. wide, with 30 ft. of water at low tide, berth room for four ships and a dumping capacity of one 50-ton car every two minutes.

A COMPARISON OF FOREIGN AND LOCAL EXPORT FUELS

As said elsewhere, it is difficult to make an accurate comparison, based on calorimeter tests between these coals, owing to the fact that many of the tests of British coals, as published, have been made with the Thomson

and Favre & Silbermann calorimeters and comparatively few with the bomb (Mahler) calorimeter, as used in the United States. The Thomson instrument gives uniformly lower results than does the Mahler type, while the Favre & Silbermann determinations are liable to error, owing to the delicacy of the instrument, and the results obtained are usually higher than those obtained from the Mahler.

However, the results, as given elsewhere, show very little difference between the coals under consideration; as regards theoretical heating value, the New River-Pocahontas coals yield slightly higher B.t.u. values.

Ash—The results of analysis show that the ash content of the two kinds of coal is about the same. The United States coals have sometimes shown a greater amount of refuse under boilers, because, where comparative tests have been made the grates were designed for burning the Welsh product and the stokers were accustomed to handling it.

Sulphur—Here the United States coals have a slight advantage, although the amount of sulphur in any of the coals is too small to be of importance.

Volatile Matter—The Welsh coals are uniformly lower in volatile than the local product, which lowers their heating value to some extent (see remarks under Table IV) and causing them to give off slightly less smoke, although this is largely a question of proper combustion conditions and firing.

TABLE III. TYPICAL ANALYSES OF DIFFERENT GRADES OF NEW RIVER COALS

	1*	1a*	1b	2†	3†	4*	5*	6†	7†	8*	9*	10†	11	12	13	14
Moisture.....	0.86	0.77	1.08	.....	.....	0.812	0.65	.....	.....	1.107	1.46	.....	0.94	.....	.....	1.51
Volatile.....	19.61	17.24	19.63	19.625	.....	17.27	21.94	.....	.....	20.50	20.36	20.62	22.16	20.399	20.32	21.90
Fixed carbon.....	76.05	79.42	74.13	76.842	.....	77.588	73.62	.....	.....	73.37	73.89	74.80	75.85	75.99	75.87	78.10
Ash.....	3.46	2.57	5.16	3.564	.....	4.33	3.79	4.84	5.395	4.96	4.35	4.58	1.99	1.35	1.75	1.74
Carbon.....	85.29	86.26	83.05	.....	83.846	85.092	.....	.....	.....	.....	.....	.....	.....	.....	.....	86.29
Hydrogen.....	4.87	4.93	4.94	.....	4.707	4.546	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.60
Oxygen.....	3.99	4.22	4.53	.....	3.415	3.974	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.54
Nitrogen.....	1.53	1.48	1.46	.....	1.44	1.366	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50
Sulphur.....	0.83	0.54	0.86	0.677	0.749	0.746	0.705	.....	0.813	0.828	0.837	0.68	.....	0.302	0.46	0.76
B.t.u.....	15,006	15,286	14,666	15,263	14,857	15,007	15,215	14,985	14,881	15,053	15,007	14,934	15,159	15,514	15,440	15,516

*Air dried. †Dry.

Oxygen—The researches of Dr. David White have shown that the oxygen content of any coal has a distinct and constant relation to its heating value and that it may be considered as an impurity and as having nearly an equal anti-calorific value with the ash. In this respect the Welsh coals show slightly better, although the combined ash and oxygen will give about the same totals with each kind of coal.

Preparation—The United States coals are not, on the whole, as well prepared as the Welsh. More care is taken with the Welsh coals both in mining and cleaning and they are prepared to suit more nearly the needs of the buyer and consumer.

Large and Small Coal—The slack or small coal in the local run-of-mine product is pure and of higher value than that from the Welsh coals. This is conclusively shown by analyses of briquettes from each, those from the Welsh coal being made from the dock screenings of the large coal, while those from the New River-Pocahontas were made from the run-of-mine smalls.

The following analyses of briquettes will be of interest here:

	New River-Pocahontas				Welsh		
Moisture.....	1.40	1.06	2.70	1.50	.....	1.30	1.50
Volatile.....	19.88	17.30	20.28	16.50	18.50	15.87	.....
Fixed carbon.....	73.22	76.13	72.74	73.00	.....	75.52	.....
Ash.....	5.50	5.51	4.28	9.00	7.40	7.69	6.60
Sulphur.....	0.58	0.65	0.81	0.81	.....	.....	0.90
Hydrogen.....	4.32	4.70	4.94	.....	.....	.....	3.90
Carbon.....	83.62	85.15	83.75	.....	.....	82.60	83.30
Nitrogen.....	0.89	1.09	1.45	.....	.....	.....	.....
Oxygen.....	5.09	2.90	4.77	.....	.....	4.70	3.00
B.t.u.....	14,796	14,836	14,886	.....	13,167	14,089	13,740

Clinkers—The writer has been unable to find any actual tests of the ash-fusing point of Welsh coals; a series of tests of a standard New River-Pocahontas coal showed an average of over 2600° F. Actual experience in burning Welsh and New River-Pocahontas coals under boilers has shown, in specific cases, that the latter coals will not clinker any more readily than do Welsh coals, and that the percentage of clinker to total refuse is smaller.

RESULTS OBTAINED FROM ACTUAL TRIALS

When each coal is burned under suitable conditions, the evaporative results obtained from New River-Pocahontas fuels will be quite as high as those yielded by the Welsh coals. Under certain conditions, the former coals will show greater economy and make more steam per pound of coal per hour, owing to their superior coking qualities and higher percentage of volatile matter.

As stated elsewhere, the Welsh export coal is harder and is usually screened at least once, hence reaching the consumer with a larger percentage of lumps, while on the other hand, all of the New River-Pocahontas coals are run-of-mine or "wro't thro'" coals and are not screened at all. This is often the basis for complaints against the American coals, although it is really an advantage, as good run-of-mine, semibituminous coal will yield better results than lump coal; the stoker has less labor on account of the coking qualities and the swelling of the

coal into a more or less cellular mass when burning, gives quicker combustion, prevents the coal from falling through grates and makes less smoke.

Firing—The amount of work done by the stoker or fireman, accustomed to handling the New River-Pocahontas coals, will be less, in a day's run, than that done by a Welsh-coal fireman, when burning equal quantities of each coal under similar conditions.

Wear and Corrosion of Heating Surface—The corrosion and wear of heating surfaces, grates and connections and the cleaning of tubes is about the same with both kinds of coal.

Variation in Quality—There will be found less variation in quality in the New River-Pocahontas coals than in the 26 Welsh coals on the British Admiralty list.

Stowage—The New River-Pocahontas coals, being all run-of-mine, will stow more closely and will yield more heat units per cubic foot of space occupied, the specific gravity of the two coals (Welsh and New River-Pocahontas) being practically the same, 1.27 to 1.31.

Weathering and Storage—The heat value loss under storage may be considered as negligible with both the coals under consideration. Recent exhaustive tests made by the United States Bureau of Mines have proved that, under actual storage conditions, under cover, in the open and under water, in both hot and cold climates, the loss in heating value of the New River-Pocahontas coals is less than 1 per cent. per year.

Spontaneous Combustion—While for obvious reasons, no comparative figures or tests are available, the fact that the U. S. Navy gets its main supplies now, and has done so for years, from the New River-Pocahontas mines and that these same coals are the only ones that the U. S. Government will accept for the Panama Canal work, where thousands of tons are kept in storage, in the open, under the most likely conditions for spontaneous combustion to take place, proves that these are, from actual experience, known to be comparatively free from fires due to spontaneous combustion. There is no bituminous coal that is not liable to fire, under certain conditions and the Welsh coals are not excepted from this liability.

GAS AND LOCOMOTIVE COALS

It must not be thought that New River-Pocahontas coals are the only local ones that can compete in the foreign trade. There are large markets in Europe and South America for coals used in the manufacture of illuminating gas and at least two large gas works in South America have contracted for a year's supply from this country. Our gas coals are quite equal in every way to those from Great Britain and there is no reason why we should not share in this business.

The following laboratory results are the average obtained from eleven mine samples of best Durham (England) gas coal, compared with results obtained from a shipment of 50 tons of West Virginia gas coal in actual practice:

	Durham	West Virginia
Fixed carbon.....	62.62	61.11
Volatile.....	30.17	33.16
Moisture.....	1.26	.....
Sulphur.....	1.19	1.18
Ash.....	4.76	5.73
Coke yield.....	67.93	74.91
Gas per ton of coal.....	11,115	10,842
Candlepower.....	16.65	17.42

In my opinion, there will also be a large market in South America and the West Indies, and possibly in some of the Mediterranean countries, for the medium high-volatile coals of the United States, that are suitable for use as locomotive fuel. There are no better locomotive coals in the world than some of the medium high volatiles (30 to 35 per cent.) mined in West Virginia and Pennsylvania; they will yield the highest evaporation per square foot of heating surface per hour, or, in other words, make the most steam per minute and when properly handled and under suitable conditions will make little smoke; they are also hard and lumpy and will stand transportation well.

As long ago as 1902, a cargo of such West Virginia coal was shipped to Chile and gave excellent results on the State Railways. These same railways are now using large amounts of Australian (116,200 tons) and Chilean (403,000 tons) coals, both of which are high volatile and decidedly inferior in every way to the United States coals mentioned above; they are testing Japanese coal this year, also high volatile. We should secure practically all of this South American railway trade.

Typical analyses of United States locomotive fuels are given below:

Moisture.....	1.60	1.47	1.17	0.87	1.28	1.54
Fixed carbon.....	58.92	57.59	62.95	62.19	59.03	58.367
Volatile matter.....	32.12	34.83	31.87	32.36	33.77	34.985
Ash.....	7.36	6.11	4.01	4.58	5.92	4.499
Sulphur.....	0.92	0.89	0.91	0.68	0.68	0.887
B.t.u.....	14,153	14,154	14,821	14,776	14,333	.....

† These analyses are taken from the U. S. Geological Survey Bulletins, 382-348 and represent actual shipments.

SMITHING AND COKING COALS

There is also quite a large market for smithing coals in South America which we have never made any effort to enter. The coals now used for this purpose come mostly from England (Cardiff and Swansea), the best of which come from the Rhondda No. 3 seam in Wales (analysis given elsewhere). While these are very pure and have been famous for years, they are not in any way superior to the highest grade smithing coals of the United States, such as Piedmont, New River, Valley Forge, Blossburg and Pocahontas. I witnessed a test of ordinary Pocahontas slack from a cargo of steam coal, in a railway shop in Chile, against Swansea smithing coal and the former gave results that were entirely satisfactory, at a lower price for the coal.

The market for coke in South America is also quite extensive; nearly all coke used is imported from England and Germany and Australia. No late consumption figures are obtainable, but it is a business well worth looking into. In 1909 coke was exported from South Wales as follows, in long tons: Chile and Peru, 6258; Argentine, 13,513; Uruguay, 12,543; Brazil, 12,618; Cuba, 2693. The total British exports of coke in 1911 were 1,064,000 long tons.

Exports from the United States during same period were 1,023,839 short tons, most of which went to Mexico and Cuba. Germany also sent 171,000 tons of coke to South America and Mexico during 1911.

Our best Eastern cokes are as good as either the Welsh Durham or German and can be put on ships at a lower price. Present quotations on best Durham foundry coke are \$4.76 f.o.b. Tyne ports, while ordinary Cardiff foundry coke is quoted at \$5.24@7.20 f.o.b. and Special foundry \$7.44@7.67.

Analyses of United States and British cokes are given below:

	Durham Foundry Cokes			Welsh Foundry Cokes		
Fixed carbon.....	90.30	91.06	93.79	93.234	92.69	90.20
Volatile.....	.....	.....	.....	.....	.....	0.21
Ash.....	8.40	7.87	5.47	5.97	5.63	7.75
Sulphur.....	0.85	0.91	0.66	0.774	1.09	0.51
Moisture.....	0.45	0.16	0.08	.....	0.59	1.84
Phosphorus.....	.....	.....	0.003	0.022	.....	0.0041

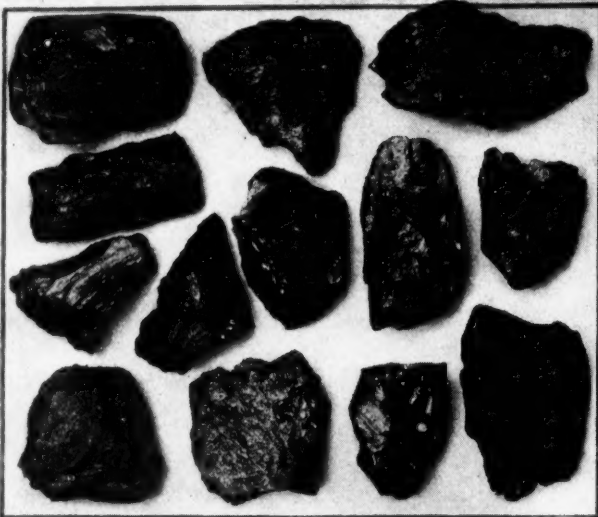
	Pineville, Ky.	Pocahontas	New River	Toms Creek, Va.	Elk-horn	Best Connells-ville
Fixed carbon.....	94.66	92.694	93.04	91.85	92.74	91.00
Volatile.....	0.410	0.341	1.34	1.26	1.033	1.70
Ash.....	3.78	5.822	5.24	6.73	5.63	7.30
Sulphur.....	0.59	0.738	0.69	0.55	0.451	0.47
Moisture.....	1.14	0.345	0.36	0.16	0.142	.....
Phosphorus.....	0.007	0.006	0.007	.....	0.003	0.012

The above analyses are from the following authorities: U. S. Geological Survey, Bulletins 261, 348 and 290; "Coke," by John Fulton; Greenwell's "British Coals and Cokes."

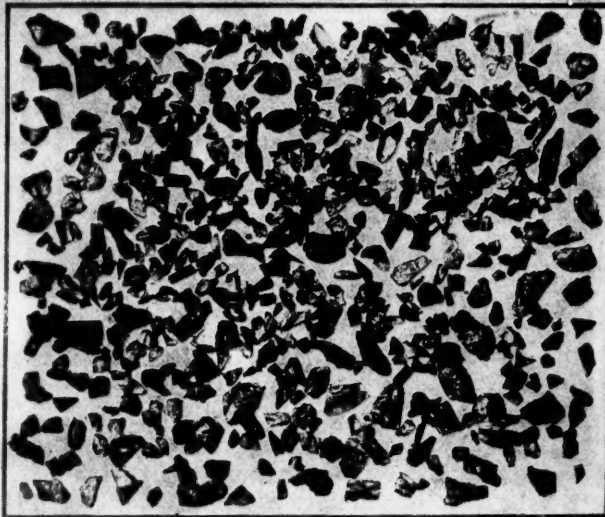
The comparisons given above are based, partly on the heating values of the coals considered, from the best available information, and partly on an experience running through some fifteen years of actual contact with the handling of New River-Pocahontas fuels in foreign markets.

The only solution of the export question for the United States shippers lies in the creation of a consolidated selling agency to handle the sales of all Eastern coal to foreign countries. Such an agency should have not only a single responsible head to direct the whole business, but also a first-class technical department. This department should have charge of the inspection and preparation of the coal, as well as its handling.

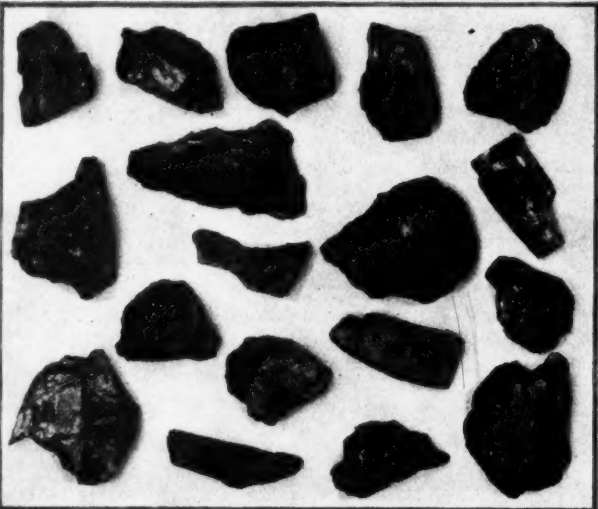
Suggested Anthracite Steam Sizes



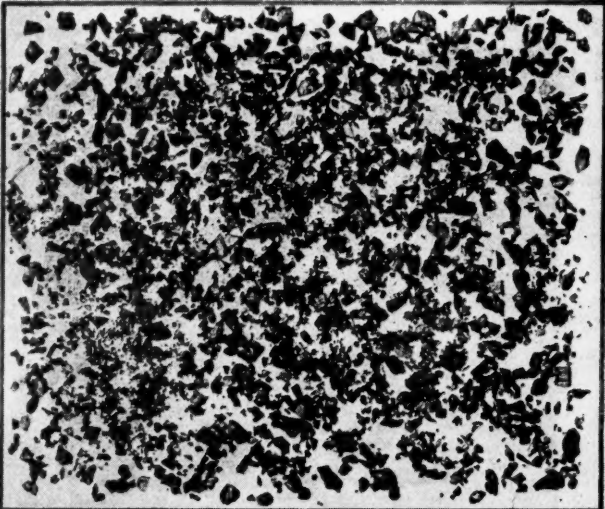
PEA



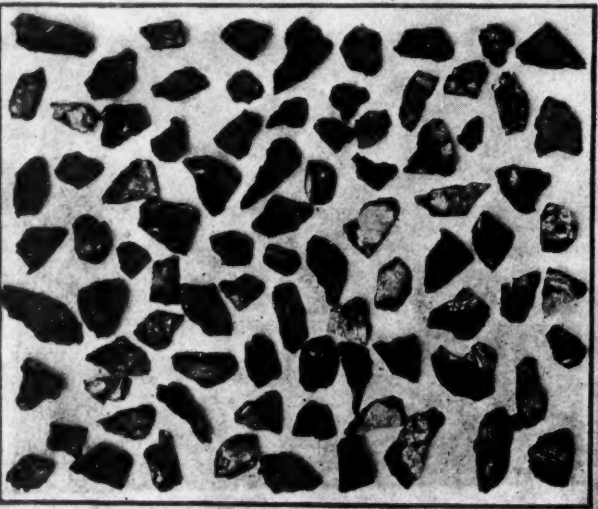
No. 3 - BUCKWHEAT OR BARLEY



No. 1 - BUCKWHEAT



No. 4 - BUCKWHEAT OR CULM



No. 2 - BUCKWHEAT OR RICE

POWER

STANDARDS FOR ANTHRACITE STEAM SIZES,
RECOMMENDED BY THE AMERICAN SOCIETY
OF MECHANICAL ENGINEERS IN THE SO-
CIETY'S *Journal*, NOVEMBER, 1912:

Steam Grades	Circular Screen or Opening Through or Over Which Coal Will Pass, Inches	
	Through	Over
Pea.....	1	1 1/4
No. 1 buckwheat.....	1 1/4	1 3/4
No. 2 buckwheat.....	1 3/4	2
No. 3 buckwheat.....	2	2 1/4
No. 4 buckwheat or culm.....	2 1/4	2 3/4

Power states that the sizes specified by the New York City Department of Water Supply, Gas and Electricity are practically the same as above except for pea coal, which is specified as coal which will pass through 3/4-in. and over 1 1/2-in. openings.

Economical Steam Mine Hoists

SPECIAL CORRESPONDENCE

SYNOPSIS—For shafts over 1200 to 1500 ft. deep the first-motion Corliss type of hoist appears to be the most economical, but for shallower depths even the simple slide-valve engine has the advantage. For such locations a valve with a cutoff which is varied automatically has been developed showing satisfactory results.

Operating economy is a subject of rapidly growing interest to all coal-mine owners and managers. A few years ago, many owners did not seem to appreciate that the use of engines and machinery, high in consumption of steam, were profit wasters. Then, too, it was customary to burn run-of-mine or lump coal under the boilers, grades which found a ready market.

At the present time, practically every grade of coal

tion Corliss plants, but in mines of over 1200 or 1500 ft. depth, such hoists could be employed with great operating economy. The ordinary Corliss hoisting plants will consume about one-third as much coal in a given space of time as the plain slide-valve engines usually employed.

The photograph, Fig. 1, shows a typical Lake Superior country first-motion hoist. It is equipped with steam reverse and steam brakes and an automatic throttle-closing mechanism, which cuts off the steam from the main throttle at a fixed point in the hoist, so that if the engineer should forget to throw his lever at the proper time, the steam will be shut off automatically and it will be impossible for the skip or cage to come to the landing under steam pressure.

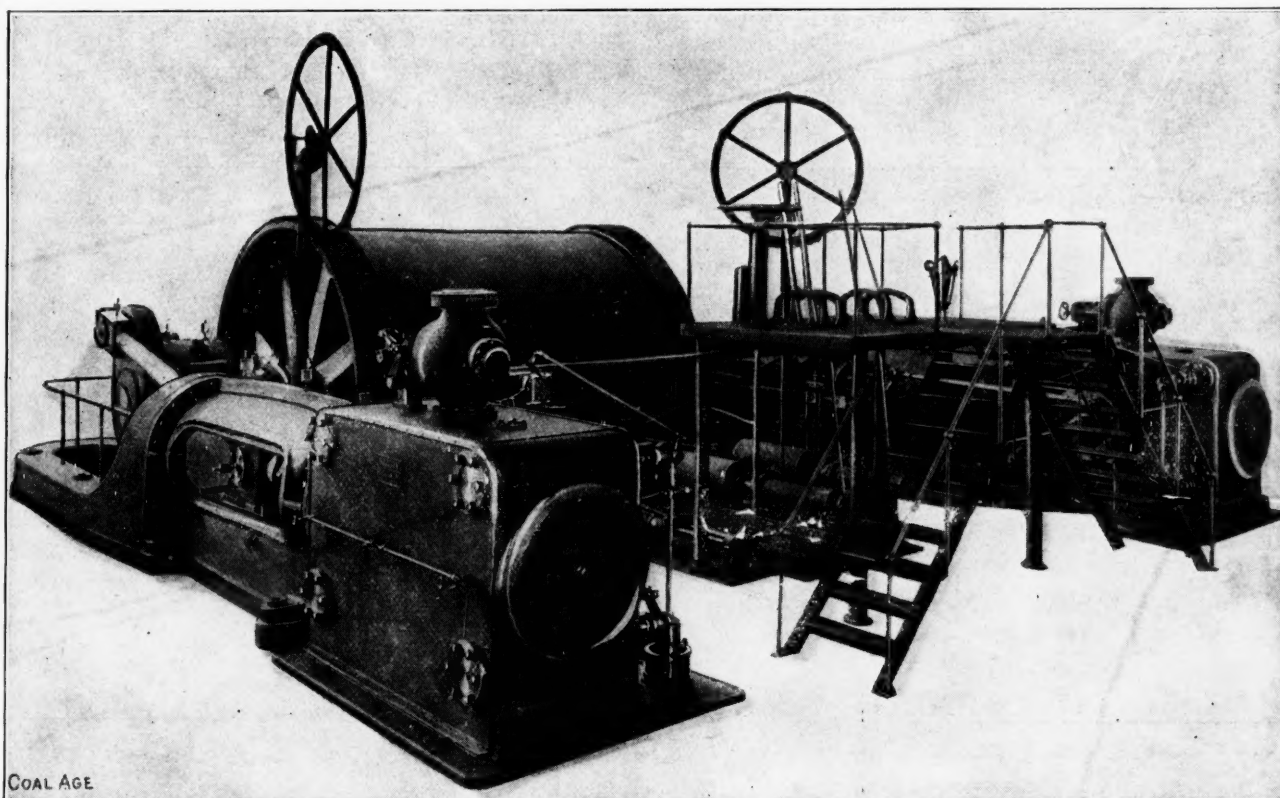


FIG. 1. A 28-60-IN. FIRST-MOTION CORLISS HOIST

hoisted from the mine has a market value, and managers are realizing that the installation of power equipment of high fuel economy is desirable, if maximum profits are to be obtained.

HIGH ECONOMY HOISTS

In the iron and copper fields of northern Michigan and in the precious-metal mines of the West, hoists of high economy have long been favorites. In the Lake Superior country, first-motion hoists with Corliss engines and many refinements, are necessary in order to produce the heavy tonnages from the great depths there encountered.

In ordinary coal-mining work, the depths of the shafts are not sufficient to permit the installation of first-mo-

A further safety device is the automatic brake, which goes into action in a similar manner, in case the brake levers should not be thrown, in time to stop the hoist at the landing.

For mines less than 1000 or 1200 ft. in depth, which are the rule in coal mines in this country, it is out of the question to use first-motion Corliss hoists, as already mentioned, on account of the limitations in speed of the Corliss valve-gear, requiring engines unduly large for the service rendered. In shafts only a few hundred feet in depth, after the load is accelerated, but few revolutions of the engine will be made with the automatic cutoff in action, so that a direct-acting Corliss plant would be needlessly high in first cost, and actually more extravagant in fuel than a slide-valve engine.

Corliss geared hoists have also been tried for shallow mines, but as in the case of first-motion hoists, engines disproportionately large had to be supplied, to keep the number of revolutions as low as possible.

SLIDE-VALVE HOIST WITH AUTOMATIC CUTOFF

After much study, the Sullivan Machinery Co. has developed an automatic slide-valve type of hoist which has now been in satisfactory use for several years.

In hoisting engines, hand adjustment of the point of cutoff is out of the question. It would require an engineer's constant attention, to give his engine steam for the entire stroke when starting the load, to set the valves at the proper point of cutoff when the load is under full motion, and to lengthen the cutoff again, at the end of the trip. Neither would it be possible for the engineer to set the cutoff at its most economical point each time, owing to variations in steam pressure and load.

The engine of this hoist is of the plain double slide-valve pattern, the valve-gear placing no limit on the speed at which it can be run. The mechanism controlling the automatic cutoff is so arranged that no extra thought or action is required on the part of the engineer.

When the steam-admission lever is pulled, the first two or three inches of its movement opens the main throt-

tle usual link motion, a third eccentric being employed for the cutoff. The range of the cutoff is from three-quarters to one-quarter at the latest setting, and from four-tenths to one-tenth at the earliest.

The hoists embody the most modern practice in all details. The engines are reversible, by a standard hand-operated link motion. The drum is keyed to the shaft. The brakes are thrown by steam, with a handwheel for use in emergency or when the plant is not under steam. The gear is of semi-steel, and the pinion is made of cast steel, with cut teeth of the short involute pattern, rendering the action of the hoist smooth and quiet.

While these hoists have been used for the most part in the iron mines of the Lake Superior district, in which they have given excellent service, there are many conditions met with in coal mining wherein they would take care of the required output satisfactorily and result in a tremendous saving in fuel over the plain slide-valve engines in such general use at the present time.

❖

Difficulties in Indian Mining

In an address before the National Association of Colliery Managers (Yorkshire branch), England, J. R. R. Wilson, a British mine inspector, told the following tale:

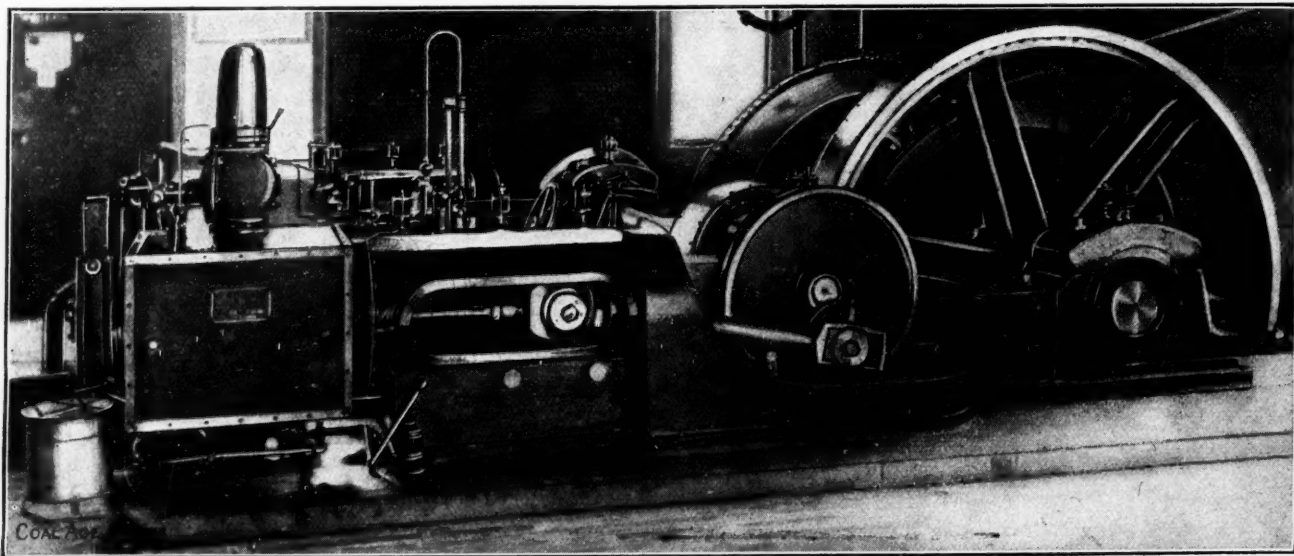


FIG. 2. A TYPICAL, GEARED, AUTOMATIC SLIDE-VALVE HOIST

tle, admitting steam during the entire stroke to start the load from the bottom. As the lever is pulled back, it admits steam to an auxiliary valve mechanism and cylinder. The piston of this cylinder actuates a crank and shaft, which in turn moves a vertical rack at the rear end of each cylinder. These racks engage pinions, one at the outer end of each cutoff-valve stem. The admission of steam to the auxiliary cylinder, therefore, automatically places the main valves in the position of the shortest cutoff. At the end of the trip, the reversal of the lever, to close the main throttles, admits steam to the opposite side of the piston on the auxiliary cylinder, and the cutoff is restored to its first position.

As stated above, no attention to the cutoff mechanism is needed, after the eccentrics have been set, to secure the most economical operation possible with the service factors of steam and load pressure which are prevalent. The slide valves are operated by separate eccentrics, with

In India instead of using canaries or mice as indicators of the presence of carbon monoxide in fighting mine fires they use chickens quite frequently. A gang of men in charge of a Eurasian was building a stopping to close in a mine fire. As a precaution a chicken was placed in by, and the man in charge went frequently to ascertain if it was dead or alive.

The men knew very well that if the chicken died they could be sent out of the mine and moreover would receive their wages in full. Taking advantage of the boss' tendency to doze, a man would slip away from the rest, and after quietly wringing the chicken's neck would return to work. After awhile, they would contrive to make a noise which would waken the boss, who would immediately jump up, go and examine the chicken, only to find it dead. The men, of course, were sent out of the mine without delay.

The Indian's method of work is peculiar. On this subject Mr. Wilson said:

The whole family goes into the mine, father, mother and children, leaving the hut locked up. The males dig the coal and the women carry it, often long distances and 80 lb. to a load. The first mine I visited was a shaft and when the cage came up a woman with a black baby in her arms stepped out of the cage.

Electric Power in Collieries

SPECIAL CORRESPONDENCE

SYNOPSIS—Many operators and mine managers look with more or less justifiable suspicion upon the employment of electricity as a motive power in mines. This article calls attention to some of the common difficulties which occur in the operation of motors underground.

❖

There is no doubt that electric power in collieries has come to stay, and that its introduction has proved a distinct advantage in the processes entailed in the actual mining and transporting of the coal to the surface. It is, however, quite a matter of ordinary experience that a great many mine operatives and even managers have a certain amount of distrust of electric power which is not altogether without foundation in actual experience.

The large number of electrical plants which are working satisfactorily and with good results in economy rather tends to show that where trouble has occurred it may have been more or less preventable. Hence there is justification in bringing forward one or two notes of a minor character concerning incidents which have happened in connection with electro-motive power in mines in order to expose the causes which lead to such difficulties and also to indicate to a certain extent the way in which they might have been avoided.

LITTLE TROUBLES WHICH GROW

A great deal of the trouble which occurs in collieries is due to the fact that apparatus is frequently placed in an awkward and ill-lighted position and is moreover not always given the proper amount of attention. The result is that troubles which at first may be insignificant and easily preventable, if allowed to accumulate, develop into quite serious matters.

A very typical case of this nature is to be found in connection with the breakdown of an alternating-current motor which was employed to drive a dip pump. This machine had been in operation for some time, but little attention being bestowed upon it, and, owing to the intrusion of grit into one of the bearings, this bearing ultimately seized. Unfortunately, however, the man in charge of the plant failed to stop the motor, perhaps hardly realizing that anything serious was wrong.

One of two things was, of course bound to occur. Either the seizing would be serious enough to stop the motor and hence by a virtual short-circuit blow the fuse, or the bearing itself would have to give way. The latter actually occurred. The brass bush which seized on the shaft was found to be running round with it, and the amount of heat generated was naturally considerable.

In order to effect a repair the brass had to be knocked off the shaft by means of sets and thoroughly scraped. The shaft was then replaced and the machine was running again in two hours after having been stopped. Taking into account the serious nature of the seizing, this may be reckoned a very quick job, but it was a matter which should not have occurred at all with proper attention.

A great deal of trouble with motor drives in collieries occurs through failure of insulation due to the damp locations in which they are called upon to work. The hu-

mid and sometimes hot atmosphere of a mine is extremely trying to an electrical installation and the remarkable fact is not that breakdowns occur, but that they are not far more common. Their infrequency points to the excellence of the work which is now being turned out by motor manufacturers.

It will often be found, also, that the cause of trouble with an electric drive is traceable not to the motor itself but to the apparatus controlling it. Here, again, although occasionally the fault may lie with the manufacturer, it is frequently caused through insufficient attention to the needs of the equipment.

It was found in connection with the motor driving a main and tail haulage that it started up very sluggishly and was therefore difficult to control. The trouble gradually became so bad that at last it was quite often the case that the rope was broken. Eventually a thorough overhaul and investigation was made not only of the motor itself, but also of the controlling apparatus.

It was then discovered that the liquid starter which was being used had not been cleaned out for months, but as the water evaporated a fresh supply had simply been added. As these replenishments had been obtained from the mine itself, it can be readily understood that when the tank was emptied a considerable quantity of mud and other impurities was removed.

After clean water had been provided and the requisite amount of salt added, it was found that the machine which had been giving so much trouble worked in a perfectly satisfactory manner. In this instance the mine management learned a valuable lesson on the importance of a thorough periodic overhaul.

THE MAKER MUST CONSIDER THE EXACTING CONDITIONS

As was mentioned above, it sometimes occurs that the manufacturer has not thoroughly grasped the peculiar conditions attendant on mine operation. The result is that apparatus which may perform its work satisfactorily above ground, fails in mining service. This often applies to the auxiliaries.

The temperature of a mine is frequently in excess of that common in a factory and in addition to this there is a large amount of moisture contained in the atmosphere. These causes sometimes lead to breakdown.

In one installation, for example, the no-voltage coils on some oil switches repeatedly burned out. Sometimes the failure occurred twice in one week. The instruments could not be used without these coils, unless the switch was fastened in, and as this was a dangerous proceeding, a considerable number of stoppages took place.

After various methods to obviate the difficulty had been tried without success, it was decided that the root of the matter lay in the fact, that, considering the temperature and humidity of the air, the coils were of too small a cross-section for the current density they carried, and as a result they were rewound with a slightly larger wire, provided with a better class of insulation. After this had been done the trouble entirely ceased.

This is a very useful instance of the extra care and attention which has to be paid by manufacturers of electrical mining equipment in order to safeguard against the extremely severe conditions of operation which prevail.

Railroad Coaling Plants in England

BRITISH CORRESPONDENCE

Description of one of the newest railroad coaling stations in Great Britain. Provision is made for cleaning the smoke-box and tubes, dropping the fire, filling tank and coaling the locomotive, all of which operations are accomplished in 24 min., as compared with 1¼ to 1¾ hr. by the method previously in use. The plant operates at a high speed and is designed to reduce breakage and labor costs to a minimum.

❖

An interesting description of the mechanical coal handling plant recently installed by the London & North-Western Ry. Co. is contained in a paper read before the British Institution of Civil Engineers at the end of November by C. J. Bowen Cooke, Chief Mechanical Engineer of the company. This plant removes the coal automatically from the car, conveys it to the overhead bunkers, measures it, and places it on the tender without hand shoveling of any description. This is the first of its kind

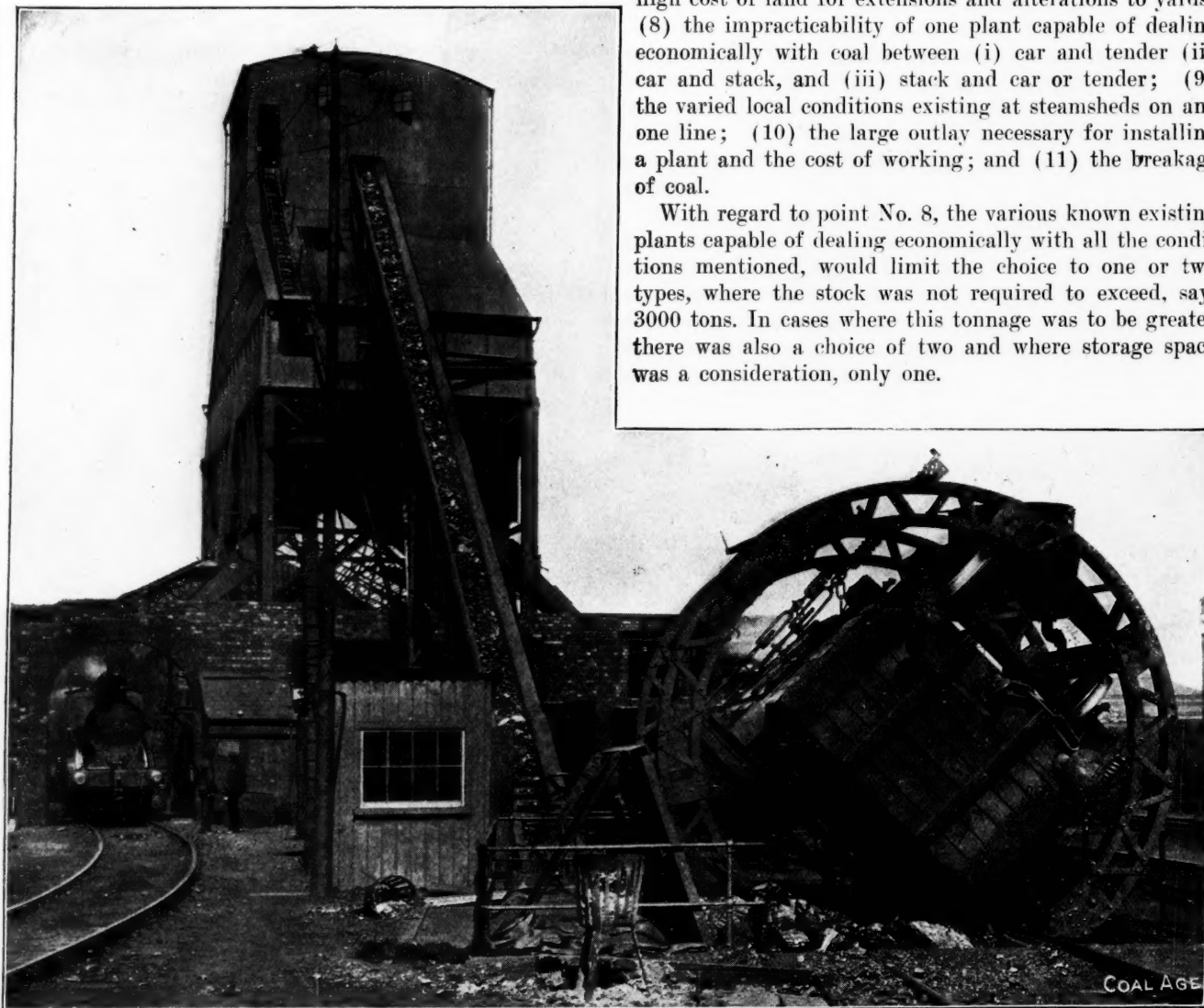
in the country, it is the joint design of Mr. Cooke and the builders of the machines.

The increasing consumption of coal at the Crewe depot, and other causes, made the cost of transferring it from the cars, amount to 7.38c. per ton. This high price, and the fact that the tonnage dealt with is the largest on the London & North-Western system, were two of the principal factors leading to the adoption of a mechanical coaling plant.

CONSIDERATIONS AFFECTING DESIGN

In designing the new plant it was necessary to consider the following points: (1) The cheap rate at which coal was now dealt with by hand; (2) the impossibility of obtaining reliable statistics of a plant suitable for British requirements; (3) the large size of coal mined in England; (4) the class and size of coal cars in use; (5) the restricted area available in most railroad yards; (6) the regular and adequate supply of coal; (7) the high cost of land for extensions and alterations to yards; (8) the impracticability of one plant capable of dealing economically with coal between (i) car and tender (ii) car and stack, and (iii) stack and car or tender; (9) the varied local conditions existing at steamsheds on any one line; (10) the large outlay necessary for installing a plant and the cost of working; and (11) the breakage of coal.

With regard to point No. 8, the various known existing plants capable of dealing economically with all the conditions mentioned, would limit the choice to one or two types, where the stock was not required to exceed, say, 3000 tons. In cases where this tonnage was to be greater there was also a choice of two and where storage space was a consideration, only one.



VIEW OF RAILROAD COALING PLANT, AT CREWE, ENGLAND, SHOWING CAR IN PROCESS OF DUMPING

In case (i) the two types were: (a) one adopted by certain railways abroad, in which the handling of stock and current coal by gravity, bucket, or conveyor was combined; and (b) some form of power driven crane and grab bucket.

With plants of type (a) the stock rarely exceeded 3000 tons and was stored in bunkers, either underground immediately below the coaling stage, or above ground and forming part of the coaling stage. In the latter case the coal was handled no less than six times between the colliery and locomotive tender, with consequent breakage at each stage. It had been argued that, owing to the deterioration of coal when left in stock out of doors for several years, it was more economical to handle it in this manner; but actual experiments had shown that a hard Yorkshire coal, after being in stock out of doors for eleven years, had deteriorated only 2.5 per cent., which is equivalent to a loss in value of 9.6c. per ton, or in the case of a 30,000-ton stack \$262 per annum.

With a soft Blaenavon coal the deterioration after seven years was, 2 per cent. which is equivalent to a loss in value of 7.2c. per ton or in the case of a 30,000 ton stack, \$309 per annum. Adding even \$309 to the \$750 for the taking up and putting down, the resultant figure—\$1059 per annum—did not leave much margin for profit on a mechanical plant, after allowing for all capital charges and for the cost of working the plant, even if one of such capacity could be designed. Further at nearly all depots in England where the annual consumption was sufficient to warrant the installation of mechanical handling, the stock coal greatly exceeded 3000 tons; so that this type of plant appeared to be undesirable.

Regarding type (b) the crane might be of the revolving derrick class travelling on rails or the bucket might be supported from a traveller running on the overhead guide of a crane of goliath type. The grab-bucket, however, was limited in size by the receptacle from which it picked its load; when, therefore, it was compelled to work out of railway cars such as those used in England it became anything but the most economical form of appliance.

In case (ii) where the stock exceeded 30,000 tons, choice could be made between the bow string girder type of conveyor and the crane and grab-bucket. Where the former arrangement was installed it was apparently used only for handling coal much smaller than that generally mined in Great Britain, and therefore, in Mr. Cooke's opinion, it was not suitable for British conditions. In case (iii) the crane and grab-bucket type appeared to be the only one available, and further comment was unnecessary.

TYPE FINALLY ADOPTED

It appeared, therefore, that so far as Great Britain was concerned, the existing types of apparatus, capable of putting coal from cars to stock, stock to cars or tender, and cars to tender, were not suitable, owing to the peculiar conditions. The problem of coaling engines direct from cars would therefore alone be considered.

With regard to point No. 10 consideration of seven different types of plant showed that a suitable one could not be erected for less than \$25,000 to \$30,000 capital expenditure. Further, that where electric current was available at about 2c. per unit, the total cost per ton of coal when handling 140,000 tons per annum would be about 4c. per ton including interest on capital, depreciation,

maintenance, and working charges. Such an expenditure, with such a result might lead locomotive engineers to the conclusion that, in their case, the experiment was not worth trying, owing to the smaller tonnage dealt with.

The consideration of certain inducements might, however, be studied before condemning such a proposition. For instance, (1), a mechanical plant, whilst occupying less ground than an old fashioned coal stage, could deal with nearly double the quantity of coal per annum; (2) there was an economical advantage in coaling as many engines as possible at a point adjacent to the collieries (where coal was cheapest) and in the shortest time possible; (3) the rapidity of coaling might enable a railway company to dispense with an engine or two, or even to refrain from building a similar number, with consequent economy of capital; (4) the release of cars would probably take place in less than half the time required at present, with consequent increase in earning capacity, and a possible reduction in the cost of shunting in the yards.

The large amount of slack created by the present manual handling was perhaps not generally realized, and the following statement might come somewhat as a surprise. After a tender had been loaded in the ordinary manner, and the coal broken by the fireman to a suitable size, the proportion of slack ranged from 13 per cent. in the case of Welsh coal to 2.3 per cent. in the case of North Staffordshire coal, although particular care had been taken to start the experiment with cars from which all slack had been removed by hand. When the slack which was in the car when it arrived at the coal stage was added to this—in this case 10.2 per cent. in soft coal and 2.9 per cent. in hard coal—the total was sufficient to make one pause to consider how this waste might be avoided. In this test "slack" meant all the small coal which was passed by a screen with $\frac{1}{2}$ -in. mesh.

DESCRIPTION OF THE PLANT

The new plant was installed at the Crewe, north steamshed where about 130 engines were permanently stabled, and where the quantity of coal transferred from truck to locomotive every 24 hr. was about 450 tons or 140,000 tons per annum.

As the coal cars belonging to the railway company had neither side nor end doors, a "tippler" capable of dealing with cars of up to ten tons capacity, became the initial part of the apparatus. It was driven by a 660 volt, direct current, electric motor of 5 h.p. and was capable of emptying a car in about five minutes inclusive of the time taken to cramp down and release the wagon.

The hopper—of mild steel plates and angles—held about 20 tons and was carried by cross girders in a brick-lined pit. The coal was fed from this hopper by a jigg-tray, through an adjustable door, and into a two-roll breaker, where the large lumps were reduced to 8 in. This breaker, was belt-driven by an independent direct-current electric-motor of 10 h.p. which also operated the jigg-tray. The coal passed, with the large lumps broken, through the breaker to the conveyor trays, which carried it to the overhead storage. At the back of the jigg-tray was fitted a chute which delivered any powdered coal that tended to work out between the bottom of the hopper and the jigg-tray.

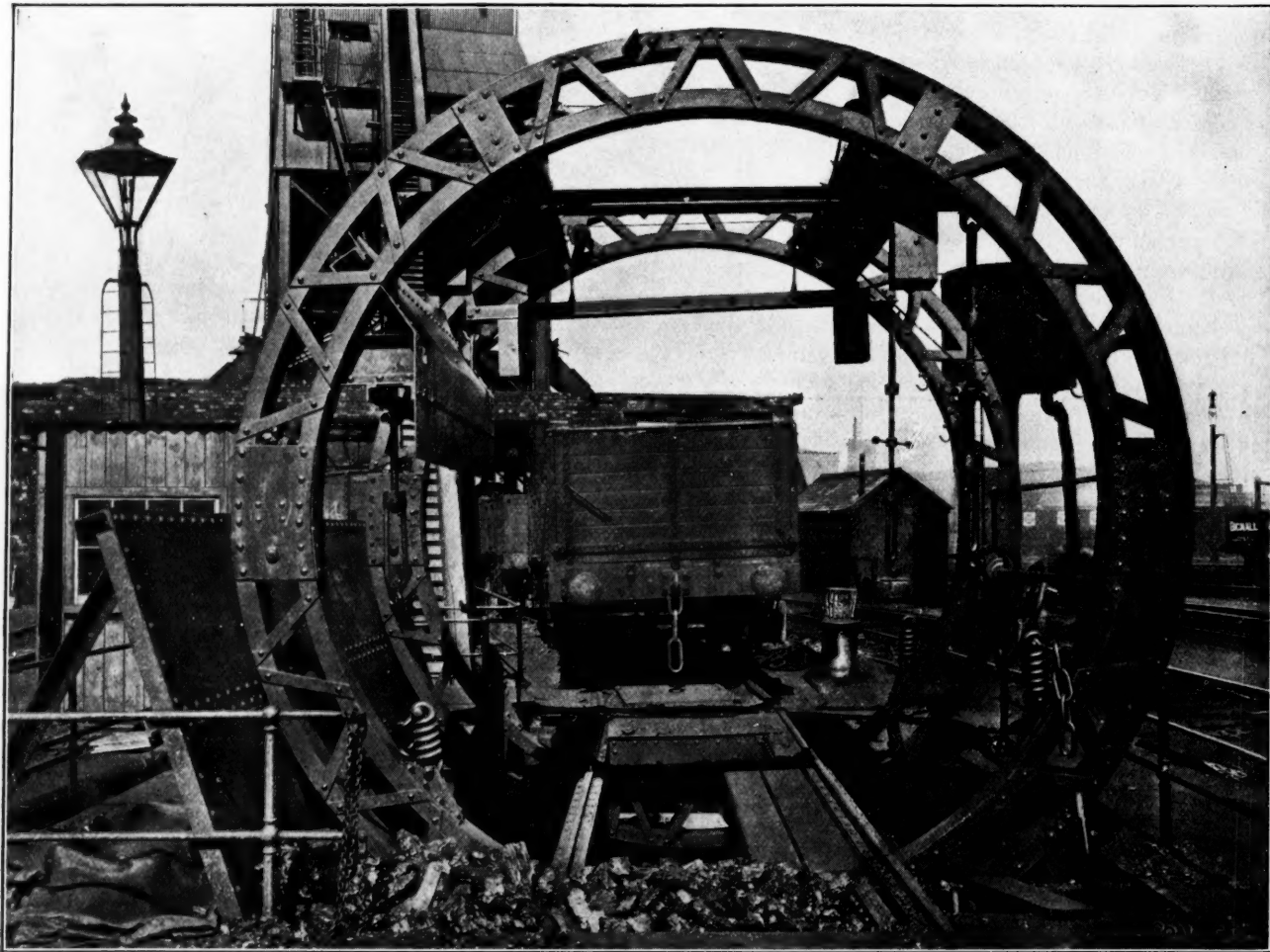
The conveyor was of the "tipping-tray" type, running at a speed of 70 ft. per minute and capable of lifting about 60 tons an hour. The driving gear consisted of a 660-volt, direct-current electric motor of 9 hp. driving through a belt, a train of machine-cut gear-wheels the effect of which was to give a very quiet drive. The coal was delivered over the end of the conveyor-track but, in order to prevent any breakage at this point, a special form of balance-plate retained it on the trays until the return journey, when it had a fall of only about one foot to the inclined chute which delivered it to the requisite division of the bunker.

Owing to a large number of the main-line engines being loaded with two classes of coal—namely, Welsh and

which a jet of air at 100 lb. per sq.in. pressure, could be blown down.

The average daily quantity of coal placed on tenders is now about 450 tons and the new plant performs this task with a staff of three men by day and one by night, the conveyor being at work approximately ten hours a day. At present between 140 and 150 engines are coaled per 24 hours, and the coal should be placed on the tenders at the rate of two tons per minute, though the rate at which engines pass through the coaling plant is governed by factors other than that at which coal could actually be put on the tenders.

Under the new condition of things, an engine coming off the turntable proceeds in the following way, and is



RAILROAD COAL-CAR DUMPING ARRANGEMENT, SHOWING ANTI-BREAKAGE DEVICE

"hard"—it was necessary to provide separate bins for each class. The bunker was therefore divided into two parts, so as to store 100 tons of Welsh and 200 tons of "hard", with the floors, of course, built to suit. There was an outlet on each side of each division of the bunker, four in all, so that the tenders could be coaled on both sides at the same time.

RESULT OBTAINED

In conjunction with the coaling plant, an ash-conveyor had been installed close to the coal bunkers. There was also a compressed air, tube-cleaning apparatus consisting of a special form of pipe that could be held against the smoke-box end of the tube, and through

detained for the time stated for each process: Cleaning smoke-box of ashes, 4 min.; filling tank at water-column, 3½ min.; cleaning tubes, 4½ min.; coaling engine, 4 min.; and dropping fire, 8 min.; or a total of 24 min. These are the actual times taken by the several operations, and as they are only a few feet apart, little additional time was occupied in moving from one to the other. Under the old conditions the time taken was 1¼ to 1¾ hours.



England's new coal-mines bill states that all newly opened coal mines shall have two main intake airways, affording means of ingress and egress to the mine, one of which shall not be used for haulage purposes. Mines employing less than 100 men, are exempt from this provision.

Diamond Crossovers for Shaft Bottoms

BY H. D. EASTON

SYNOPSIS—The article describes a neat graphical method of designing a diamond crossover to fit given conditions at the foot of the shaft.

❖

Track arrangements at shaft bottoms must be in first-class condition if caging is to be done expeditiously and the maximum output of coal is to be obtained. In cases where the caging is done from one side of the shaft only, the most rapid handling of cars is made possible. The loads bump the empty cars off the cages and allow them to run by gravity into a kick-back and thence into the empty hole. This permits the tracks on the caging side to have a gentle down grade to the shaft, and allows the loaded car to bump the empty car off from the cage almost at the instant it lands. Such an arrangement requires few bottom men.

There are many mines in which the caging is done from both sides of the shaft where it would be an inexpensive improvement to alter the arrangements so as to take advantage of natural grades and do all the caging from one side. This is true of many mines operating in pitching coals. In other cases, especially in flat beds of coal, it would be necessary to install an automatic empty car lift to run the empties into a kick-back. This would prove advantageous in cases where mines have reached the maximum capacity of caging from both sides.

THE DIAMOND CROSSOVER

In mines where all of the caging is done from one side of the shaft, a diamond crossover is needed on the caging side. When the caging is done from both sides of the shaft, two of these crossovers are necessary. It is rather common to find these diamond crossovers constructed in the crudest manner possible. Often they are built by a blacksmith, who has no design to follow, but is left to his own resources. Much time is lost in caging over such tracks and the shaft bottom is always littered with coal spilled from the well-topped cars because of the abrupt turns and sudden jars. Besides this, wrecks and derailis are especially expensive at the shaft bottom since they always impose a forced idleness upon the top men.

HOW TO DESIGN A SATISFACTORY DIAMOND CROSSOVER

The distance between the track centers is determined by the size of the shaft compartments. The track gage is known, and the weight and size of rail used. The clearance is taken to accommodate the wheels used. In addition to the above data, it will be necessary to know one of two things before proceeding with the design. First, the frog angle must be known. To most people, however, the frog angle means little, and its use would require several trials in order to find the best angle to be used. If the angle selected is too great, the crossover will be too short and abrupt; while, if too small, the crossover will be too long and occupy too much of the shaft-bottom space besides causing the cagers to travel a long way to get a loaded car, since the trips cannot be kept up close to the shaft. Second, instead of determining the frog angle, it is a very easy matter to determine how

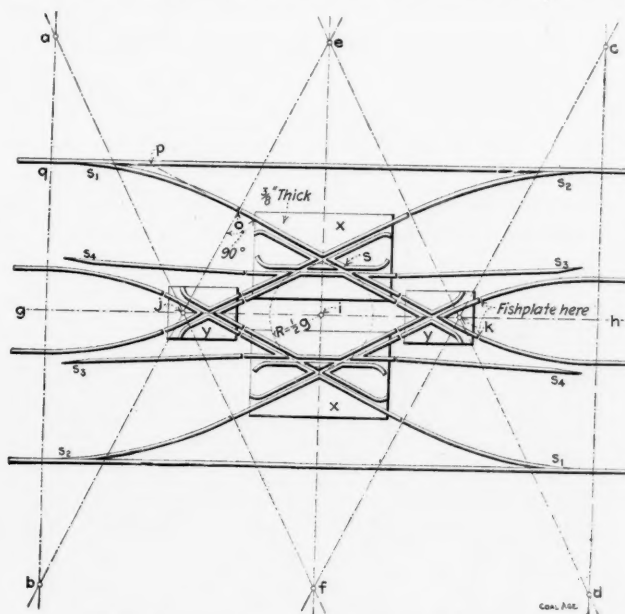
much length can be allotted to the crossover and then to design the best one for the given length.

Our proposition, then, is to design the best diamond crossover with the following data given:

1. Track gage.
2. Size of rail to be used.
3. Distance between track centers.
4. Clearance.
5. Length of shaft bottom to be given up to the diamond crossover, bearing in mind that the longer it is the greater the ease of pushing loaded cars over it.

PROCEDURE

The sketch shows a purely graphic method of designing a diamond crossover with the above data. Draw the tracks accurately to scale at the given distance apart. Erect the perpendiculars *ab* and *cd* so that the distance



THE LAYOUT OF A DIAMOND CROSSOVER

ac equals the allotted length for the crossover. Erect the perpendicular *ef* midway between *ab* and *cd*, also draw *gh* midway between the center lines of the two tracks. Establish points *j* and *k* so that *ji* = *ik* = $\frac{1}{4}ac$. With *i* as center and a radius of $\frac{1}{2}$ track gage, draw a circle.

Now place a 90-deg. triangle at *o*, so that one side will be tangent to the circle at *s*, with the other side cutting through the point *j*; shift about until a position is found, such that the distance *op* = *pq*. This can best be done by using a second triangle, or a straight-edge, against the first one so as to produce the line *so* to *p* and comparing the distances *op* with *pq* by means of a pair of dividers. With the triangle in the right position, draw the line *oj* and extend it to *e* and to *b*.

Now, locate point *f*; *ie* = *if*. Draw *fja*, *fk c* and *ekd*, thus locating the four points *a*, *b*, *c* and *d*. With these four points, *a*, *b*, *c* and *d*, as centers, use a beam compass and draw the curved portions of the diamond crossover and then fill in the remainder, as shown, using any desired clearance.

*Professor of mining engineering, Kentucky State University, Lexington, Ky.

A special drawing of the steel plate *X*, with its pieces of track, can now be given to the blacksmith with instructions to make two of these; similarly for plate *Y*, two of which will be needed. All pieces of track and guards should be riveted solidly to the plates so there will be little danger of the track being torn up by a run-away or wreck. These plates can be spiked solidly to the ties.

If the shop has the machinery available, the points *S*₁, *S*₂, *S*₃ and *S*₄ can be planed to fit accurately to the sides of the rails. There will be two of each of these. Each pair

of points can then be connected to a rod and the switch thrown as on a railroad, allowing the play to come at the fishplates. In the absence of a planer, to fit the points to the side of the rail, the usual mine points can be substituted for the planed ones.

Being made in sections, as shown by the plates *X* and *Y*, this diamond crossover can be taken into the mine without difficulty, readily assembled and, in case a wreck tears a portion of it up, it can easily be taken to the shop for repair.

❖

❖

Some Foreign Coke Oven Improvements

BY ALFRED GOBIET*

SYNOPSIS—Description of some unique departures in established coke-oven practice. These consist of two unusual door-lifters and two new methods of quenching coke. The last installations are more elaborate than would ordinarily be considered good practice in this country, but they are not without their advantages.

❖

The following are two methods of lifting and moving aside coke-oven doors, the first being that of H. Grono, Oberhausen, Germany:

The winch frame *A*, Fig. 1, balanced by the counterweight *B*, carries a roll-guided, horizontal slide rack *C* moved by a pinion *D* geared to a crank. The rack is connected with the lever *E* by the shaft *F*, and *E* in turn

cated by the dotted lines, raising it obliquely 20 to 24 in. high, out of its socket, so that it can readily be moved sidewise.

Fastened to the rope windlass by the braces *J* are the guide shields *L*, the curved edges of which serve as tracks for the rolls *M*, from which the door is hung. The rod *I* is connected with the door *K* by a hook *N*, with a balance weight *O*. As the apparatus, with the door swinging from it is moved aside, the lever *G* may be used to push forward the rod *I* and keep the suspended door from striking against the front of the ovens. For use with doors that have to be lifted straight up before removal from

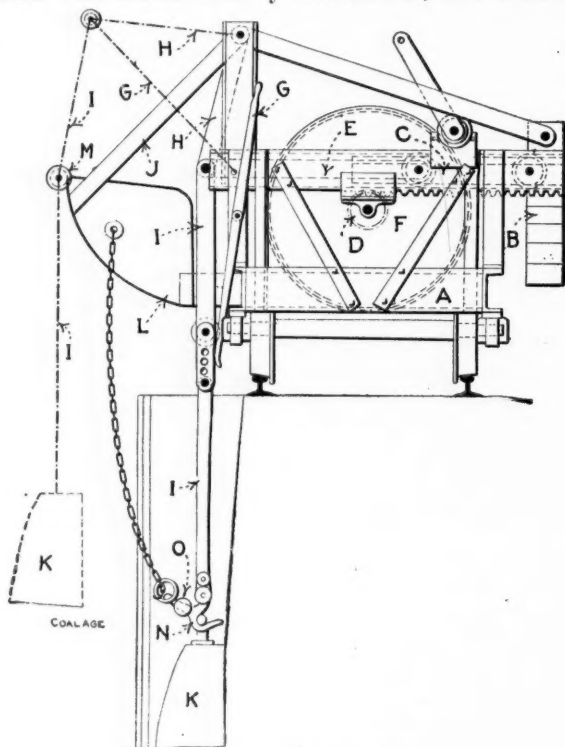


FIG. 1. GRONO DOOR LIFTER

with the lever *H*, so as to form a toggle joint. The coke-oven door *K* is suspended by means of strong, adjustable, jointed rods *I*. The movement of the rack in the direction of the arrow brings the door into the position indi-

*Engineer, the Witkowitz Mines, Ostrau, Moravia, Austria.

Note—Abstract of paper appearing in "Montanistische Rundschau" (Vienna), Oct. 1, 1912.

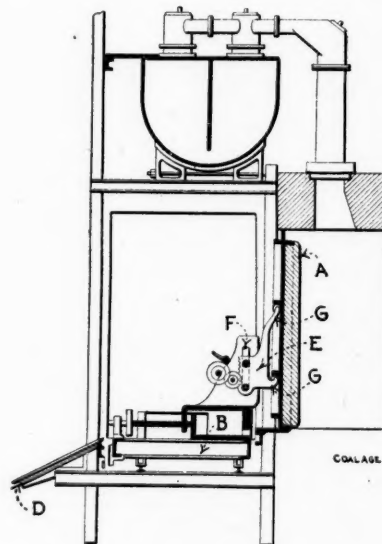


FIG. 2. COKE-OVEN DOOR LIFTER

the oven, the shields *L* may be shaped as vertical guides.

The H. Koppers door lifter, Fig. 2, is a car *B* moved in front of the oven and carrying a mechanism for raising the door *A*. A bracket with a horizontal cross movement by the screw *C* supports the lifter proper *E*, which slides on a vertical guide *F*. It is elevated by the aid of a rack, and other gearing, and can be held in any desired position. Two fingers *G* of this lifter enter corresponding hollows of the oven-door frame which may thus be raised, drawn back by means of the horizontal slide, and rolled aside by moving the car. In the construction shown in the figure, there is a bridge on the same car which, when the door is moved aside, forms a connection

between the oven floor and the inclined coke dump *D*. Moreover, the car carries two side shields which prevent an untimely dumping of the coke that is drawn out.

BLEICHERT COKE QUENCHING APPARATUS

The following quenching apparatus are patented by Adolf Bleichert & Co., of Leipzig and Vienna. The type illustrated in Fig. 3 consists of a water tank *A* of the peculiar shape shown, which runs on rails *B* in front of the oven battery; a perforated bucket *D* is let down into this tank. After the coke has been quenched, the bucket is lifted out of the water by a hoist on the frame *C*, and is thus drained. The bucket may then be placed on a car and transported to the storage yard, or the tank and bucket together may be rolled to a hopper *E* and there the coke dumped out, as shown by full lines in the drawing. Instead, the bucket may be raised to the dotted position and dumped into cableway buckets.

At the Tegal gas works, near Berlin, is installed a Bleichert quenching system on this general principle. There the coke is drawn into the bucket standing over

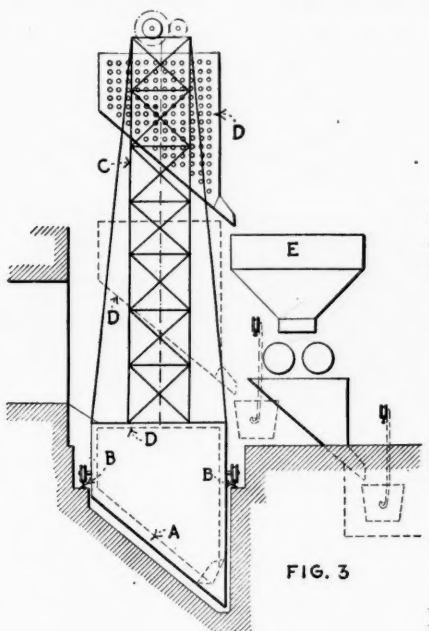


FIG. 3

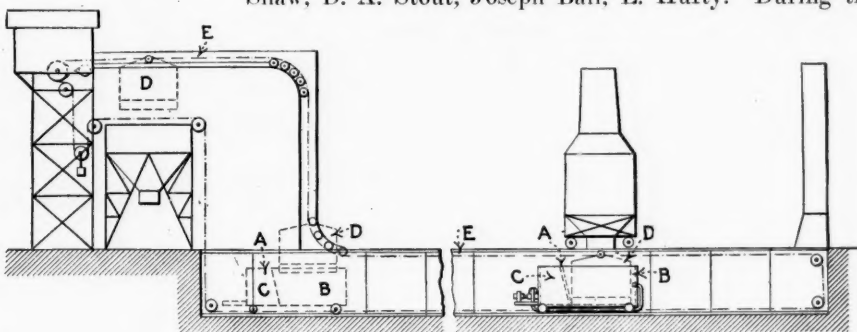


FIG. 4

FIGS. 3 AND 4. TWO TYPES OF THE BLEICHERT COKE-QUENCHING METHODS

the tank and during the operation the tank is slowly elevated so that the water gradually rises in the bucket. Afterward the tank is let down again and the bucket moved aside for emptying.

Another patented Bleichert quenching system is shown in Fig. 4. Here the water tank, and in it the bucket, are rolled on rails in front of the ovens, and after the quenching are run to a particular place at a distance, where the bucket is lifted out of the water and its contents disposed of. The tank *A* is partitioned, so that it contains the reservoir *C* and the compartment *B*, which receives the perforated bucket *D*. These two compartments are connected by piping with a pump. The bucket is fastened to an endless cable chain *E* by which both it and the tank are moved.

The quenching process is as follows: The tank is moved in front of the oven and after the charge has been drawn into the bucket *D*, the pump is set in operation to force the water from the reservoir *C* into the bucket compartment *B*. At the same time the endless rope is

started, and during transportation the coke becomes sufficiently quenched.

At a certain point beyond the oven battery the cable bends upward and elevates the bucket *D* out of the tank and carries it to a bunker or storage yard. At the bend, guide rails are provided for it. When the bucket has been dumped the movement of the cable is reversed, the bucket restored to the tank at the bend, where it is rolled to the oven to be drawn next.

❖

The Huerfano Chapter of the Rocky Mountain Coal Mining Institute

The election of permanent officers for the chapter took place in the County Court House and resulted as follows: President, Joseph Ball; vice-president, D. A. Stout; secretary-treasurer, L. Hufty; executive committee, John McDowell, Martin Brennan, James Turner, James Tyson, R. Poli.

The ones who joined as new members are: M. Brennan, John McDowell, James McDowell, T. J. Stone, R. B. Muir, John McLiver, R. F. Poli, John Harrison, John Calderhead, Marion Bainbridge, Neil McDermott, William Smith, Ernest Head, Charles O'Neill, James Turner, Joseph Angster, John Buback, L. O. Smith, James Hare, R. J. Alexander and Charles Burleson.

Charter members present were: John Neish, John Shaw, D. A. Stout, Joseph Ball, L. Hufty. During the

meeting, Mr. Stout gave a very interesting talk. Regular meetings will be held the third Sundays of each month at 2 p.m.

❖

Briquette Binders

The best binder for briquetting depends upon the locality, the character of the coal, and the purpose for which the briquettes are intended. If the mines are near an oil field, the cheapest and best binder is asphalt; the best results are obtained with about 4 per cent., which costs 50 or 60c. per ton of briquettes. Five or six per cent. of water-gas pitch is a good binder and costs about the same as asphalt; 6.5 to 8 per cent. of coal-tar pitch is probably one of the most widely available binders and the cost is from 65 to 90c. per ton. Wood-distilled tars and asphalts form good binders but, with the exception of a few localities, they are too high in cost to be generally used. Producer-gas tar gives the best of results and calls for a low percentage of binder.

Belgian Methods of Coal Working

SPECIAL CORRESPONDENCE

Owing to the difficulties under which the Belgian coal industry is operated, the margin between the cost of production and the selling price is much smaller than in other European mining countries where circumstances are more favorable.

The method of working generally used is that of continuous headings, which are pushed forward from the shaft toward the limit of the field. The room-and-pillar system has occasionally been adopted in some thick beds in the districts of the Center and of Liège, while steeply inclined seams are worked in reverse steps, and the flatter measures either by rising or forward stalls.*

PRIMITIVE METHODS OF MINING

Coal cutting is nearly always performed by hand and it is preceded by cutting, in the unproductive parts of the seam. Blasting in coal is restricted to mines containing little or no firedamp and is specially used in the hard seams of coal near Charleroi. The consumption of explosives for the getting of coal in these latter seams varies from 40 to 96 lb. per 100 tons extracted, but in other mines where the use of explosives is allowed their average consumption does not exceed 28 lb. per 100 tons.

Compressed air is applied to drilling machines and small fans. Haulage is mostly done by horses; mechanical traction is restricted to the main roads, and is less developed than in the other coal fields where the output is greater and more concentrated. Locomotives are preferred in Belgium to the endless rope or chain systems. In the colliery of Amercoeur at Jumet, the underground haulage is effected by accumulator locomotives, but of late in a number of collieries preference has been given to benzine-propelled locomotives.

The underground applications of electricity for drilling, lighting, and especially pumping, hoisting and haulage, are already numerous, but have hitherto been confined to downcast shafts and intake airways except in non-fiery mines. In most cases continuous current at a moderate voltage has been employed, but three-phase current is used in some important installations.

At present more than 50 per cent. of the companies have no underground power, except for the dumping of cars. But since the application of the new law limiting the hours of work in coal mines, the adoption of mechanical appliances has been considered by a number of companies as a matter of necessity.

THIN AND CONTORTED BEDS MAKE COAL COSTLY AND METHODS PRIMITIVE

Three circumstances have a preponderating influence on the cost of production of the Belgium mines—the thinness and contortion of the seams, the occurrence of firedamp, and the depth of the workings. The seams are split and folded everywhere. These folds and wrinkles are most numerous in the southern portions of the coal-bearing area, but while they are still well marked in the center, they become less noticeable toward the north, in the lower part of the country.

The average thickness of the workable seams is only 27 in. with 10½ in. as low limit; in several collieries of

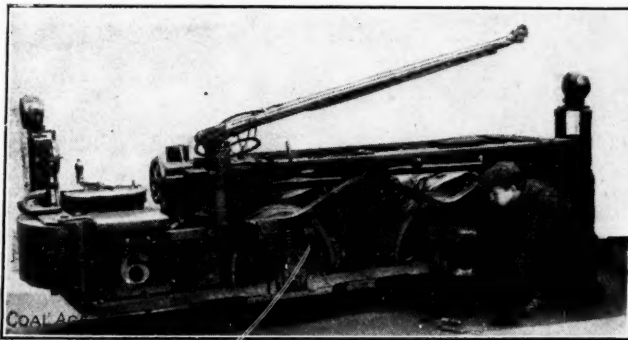
the Hainaut province the average available thickness of all the seams is from 16 to 20 in. These conditions present obstacles to the use of coal-cutting machines, which in that part of the Belgian coal field known as the "Couchant de Mons" (Borinage district) will be impracticable on account of the folded character of the beds.

❖

A New Type of Locomotive

The accompanying illustration shows a type of mine locomotive which has recently been placed on the market by the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing Co., which it is claimed will operate satisfactorily under the worst conditions with minimum attention and maintenance expense.

The motors, brake rigging, brake shoes and sand boxes are easily accessible. The upper parts of the motor and armature-bearing housings can be removed without disturbing the suspension, so that each part of the motor is exposed for inspection. The only work necessary to remove the grid resistors is to take off the locomotive covers and loosen the bolts and terminals that hold the resistor frames in place.



REMOVING A JOURNAL BOX ON AN OUTSIDE-FRAME LOCOMOTIVE

The Vaucrain removable jib is introduced on locomotives with outside frames. To remove a journal box with this jib it is only necessary to drop the binder and take the weight off the box, which may then be slipped out from the side. On locomotives with inside frames the journal-box cellars are arranged to be easily dropped out for repacking. The frames of the motors are made of cast steel, and are split diagonally. The axle bearings and suspension nose are on the lower half, so that the upper half, the armature and bearing housings can be removed without disturbing the suspension or axle brackets.

The armature core is mounted on a spider to which it is keyed, making it possible to remove the shaft without disturbing the windings, and also reinforcing the shaft against bending. Large openings are provided in the spider and through the core to give sufficient ventilation.

❖

When designing an underground stable the character of the floor to be decided upon requires special consideration. So long as the mules are shod, it does not make any difference to the foot itself what the shoe rests upon. The material used for flooring should be such as will keep the stalls and mules clean, with the least amount of work. Cement, properly corrugated, gives the best results in stable construction. Drainage should be so arranged that the slant and the direct sewer connection will remove all fluids.

*Narrow rooms usually with large pillars and frequent crosscuts dividing the ribs into large rectangular pillars.—Ed'cr.

EDITORIALS

A Bad Name

The mining industry has a malodorous name. Everywhere we go we are informed that the mines are the largest graves in the country, that nothing is being done to remedy the evil, for nobody cares about the countless sacrifices but the general public.

Really the populace is to be thanked for its keen continued interest in our delinquencies. It would be well, however, if it did not inquire into *our* conduct alone. Congress is willing to spend thirty times as much for agriculture as for mining, but it is not desirous of discovering how many agriculturists yearly succumb to the perils of farming. An investigation pursued with diligence would probably show that the number of fatalities among farmers exceeds, as in Germany, the accidental deaths of any other class of operatives.

Since 1909, no investigations have been made regarding the deaths of railroad trainmen. The Interstate Commerce Commission no longer gives publicity to such losses, but during the last year in which the record was kept, the death rate among trainmen was 4.87 per thousand.

These men were killed mainly one by one. There were no sudden reapings of men by tens and hundreds, which in years of gloom swell the death rate in mines. The record represents a far greater number of separate accidents than would be indicated by a similar figure in coal mining. Nevertheless, though this proportion has been exceeded in France and Canada, it has only once been reached in the mining records of the United States. That was during the year 1907, which is generally conceded to have been abnormal.

There are many industries more dangerous than mining, and it would be well if all were investigated. We do not advocate ceasing the good work of inquiring into the fatalities of mining. By all means let the investigation proceed as a continued prod to the industry to do better and to prove to the world that progress is being made.

The loss of life is not great, though larger than it should be. The City of New York often records as many deaths from all causes in ten days as are collected by the Bureau of Mines in a whole year. Of course, the population of the city is about seven times as great as that of the mines, and it is not just to compare accidental deaths with mortalities of all kinds.

But we need a base, a norm to control the public mind. It is easy to condemn and to rant whether the losses be few or many. The man on the street will shudder as readily when told that 1000 men died in the mines last year, as he would if you increased the number to 10,000. He has no basis for judgment and readily believes the purchased press.

For the press is venal. It may be free from the constraint and control of the multi-millionaire, but it is usually slavish before the man who pays pennies and dimes for its circulation. This press should be given a

chance to learn related facts from other bodies beside the Bureau of Mines; should be presented with an opportunity for fulminations against other persons than those who chance to be producing coal and should be afforded an opportunity to do justice to an industry which deserves to stand well in the judgment of the public.

✱

The Efficiencies of Large and Small Turbines

Ever since the conversion of the steam turbine from a scientific toy to a commercial prime mover, there has been a steady increase in the size and power of these machines. Simultaneously also they have been developed both in capacity and efficiency.

There is a marked difference in the performance of large and small turbines as they exist commercially today. The average overall efficiency of a 1000-kw. unit is in the vicinity of 57 per cent., while that of a 10,000-kw. machine may easily reach 70 per cent.

There are two principal reasons why the small machine is less efficient than the larger one. The first of these is simple and readily understood. In low-capacity turbines, a far greater percentage of the entire cost is taken up by those parts (governor, oiling system, pipes, etc.), which do not directly contribute to the internal efficiency of the unit. In a 500-kw. machine, the cost of these parts may easily reach 45 per cent. of the total, while in one of 10,000-kw. capacity, this item is only about 30 per cent. From this it may be readily appreciated that small turbines of high efficiency cannot be commercially produced unless exceptional prices are obtainable.

The second reason is more obscure, and is strictly technical. Each pound of steam contains a certain definite amount of potential energy, which, through expansion, is converted into kinetic energy, in which form it may be absorbed by the moving blading. The wide range or difference in pressure between intake and exhaust on a modern turbine, renders available a considerable amount of heat for each pound of steam, and the machine's efficiency depends upon how and in what manner this heat is distributed.

To obtain a maximum absorption of the heat energy made available by a given pressure drop, the velocity of the steam must bear a certain ratio to that of the blades. This ratio, however, varies according to the type of blading employed.

With a given speed of rotation, number of stages, and total pressure range, the radius of application or mean diameter of blading must remain constant, and the output of the machine is dependent directly upon the length of the blades. The more stages there are employed, the greater, within limits dependent upon the type of the turbine and the speed, will be the overall efficiency.

As to reliability, which is an extremely important factor in mining service, there can be but little question

but that the steam turbine is the equal, if not the superior, of any prime mover now in use. It has the further advantage that wear is confined to but a few surfaces, practically all of which may be subjected to forced lubrication, so that the maintenance charges on even the largest of units may, and under ordinary circumstances should be, so small as to be almost entirely negligible.

✱

The Committee on Gas Wells

We hope the mining inspectors of the United States will be well represented on the committee on gas wells and oil wells passing through coal. Unless the mine departments of the states do their part, there will be an imperfectly balanced council, for the gas and oil industries both have their representatives, and the coal men have no more than either of these interests.

Someone jokingly remarked at the conference that the separating of two industries, so unified in their purposes as those pertaining to gas and oil, would justify the coal men in demanding a representation both for their point of view and for that of the producers of lignite. However, if the inspectors do their part, the unfairness in representation will be met.

The Pennsylvania inspectors were represented by one man only and he came late for the third part of the conference. It seemed to bode no cooperation on the part of the inspectional service of that state where the Bureau of Mines finds its home. The sentiment of the mining public, we believe, hardly justifies that abstention.

Unfortunately, the whole question has sprung upon us before the problem of roof action has been thrashed out to a universally satisfactory conclusion. We still have many adhering to a belief in shear as an explanation of all difficulties. The Belgian bureau seems to favor this hypothesis, others believe that the roof bends but oppose the idea that the strata act as a unit, and, of course, there are others whose ideas are contradicted by every evidence, but their theories are not worthy of serious consideration. That being the case, the various departments of mining in the states should be willing to meet in conference and contribute to the consideration of the subject.

✱

Red Tape in the Geological Survey

The government printing office in Washington assumes prerogatives that are, at times, exasperating in the extreme. For instance, when one orders a series of topographic maps, he is apt to receive a notice with them to the effect that a certain sheet is out of stock, for which another one has been substituted. What firm of publishers would reply to a request for a certain issue of their magazine by sending the number immediately preceding or following the one asked for? Engineers generally know what they want and resent this apparently indifferent attention to their requests.

The procrastination (common to all government departments) in filling these orders is also prolific cause of annoyance. It is difficult to understand, for instance, why it should take eight days to get certain topographic and geologic sheets ordered from New York City. Few engineers have either the means or the facilities for filing anything like a complete set of the Geological Survey publications now in print, and it frequently happens that

one of these may be required on short notice. Unless one has connections in Washington to whom he can wire he is sure to be disappointed, for the government would not trust the greatest engineer in the country for a 10c. map.

The high excellence of the government publications, and particularly its maps, are too well known to require comment. But it is to be deplored that the distribution of these cannot be effected in a more businesslike manner. If certain maps are out of stock, the question naturally presents itself as to when they will be in again, or reprints be made. Questions as to when certain reports will be issued are ignored, and there are numerous ways in which the survey could enlarge the scope of its usefulness had it the facilities for getting in closer touch with the public. Surely it would not strain the resources of the department to install a force of correspondents, well posted on the Survey's publications and competent to act promptly and effectively on all communications received.

✱

Sand Filling

The new bulletin of N. H. Darton on the "Sand Available for Filling Mine Workings" is painstaking and complete. In fact, Mr. Darton is a most unwearied investigator. The monograph frankly acknowledges the main difficulties in the sand-filling problem, the fineness of the silts and the possibility of their running like a quicksand, if not restrained by pillars. This difficulty we pointed out in an editorial, of identical name with the present, published Nov. 25, 1911.

We then urged, and still continue to insist, that experiments on cementation should be made, and though we know Mr. Darton has been extremely busy along other valuable lines of investigation, we think it would have been well had the Bureau of Mines taken up the problem from the first.

The bureau is acting in an open way with the public. The parting and thus the most prominent words in the bulletin draw attention to the inadequacy of the available supply of sand to fill the workings. "The quantity necessary to replace all the coal which can be shipped in the future, under present conditions, is about 10,000,000 tons, or sufficient to cover to a depth of 25 ft. the whole area of the coal basin, 176 square miles. This is more than twice as much material as is contained in the buried valley of the Susquehanna River, but is about the same quantity as the contents of that valley, together with all the till and terrace deposits."

Excluding areas, now occupied by towns, and which can hardly be removed for the obtaining of the sand, it will be seen that the supply is inadequate. Still there is sufficient to do a greater part of the flushing needed, and to support and control completely those parts of the workings under permanent buildings. With such a large body of sand placed almost providentially to hand, and with the crying need for some release from the severity of the present situation, it seems that some effort should be made to guarantee a continued life to the otherwise permanent beauties of the city of Scranton.

Nevertheless, prudence compels us to declare that the removal of much of the sand in the Wyoming buried valley would involve engineering difficulties as great or greater than it would solve.

SOCIOLOGICAL DEPARTMENT

Pure Milk for a Colliery Village

SPECIAL CORRESPONDENCE

SYNOPSIS—The Heilwood Co., composed of persons forming the corporation which operates the Penn-Mary coal mines, has started a model dairy farm. The company hopes to make money on the project, but is still more anxious to assure a good milk supply for the miners, thus preventing such diseases as might result from contaminated milk. The daily expense is \$16, the income \$14.80; so in due time both health and profit may be attained.

❖

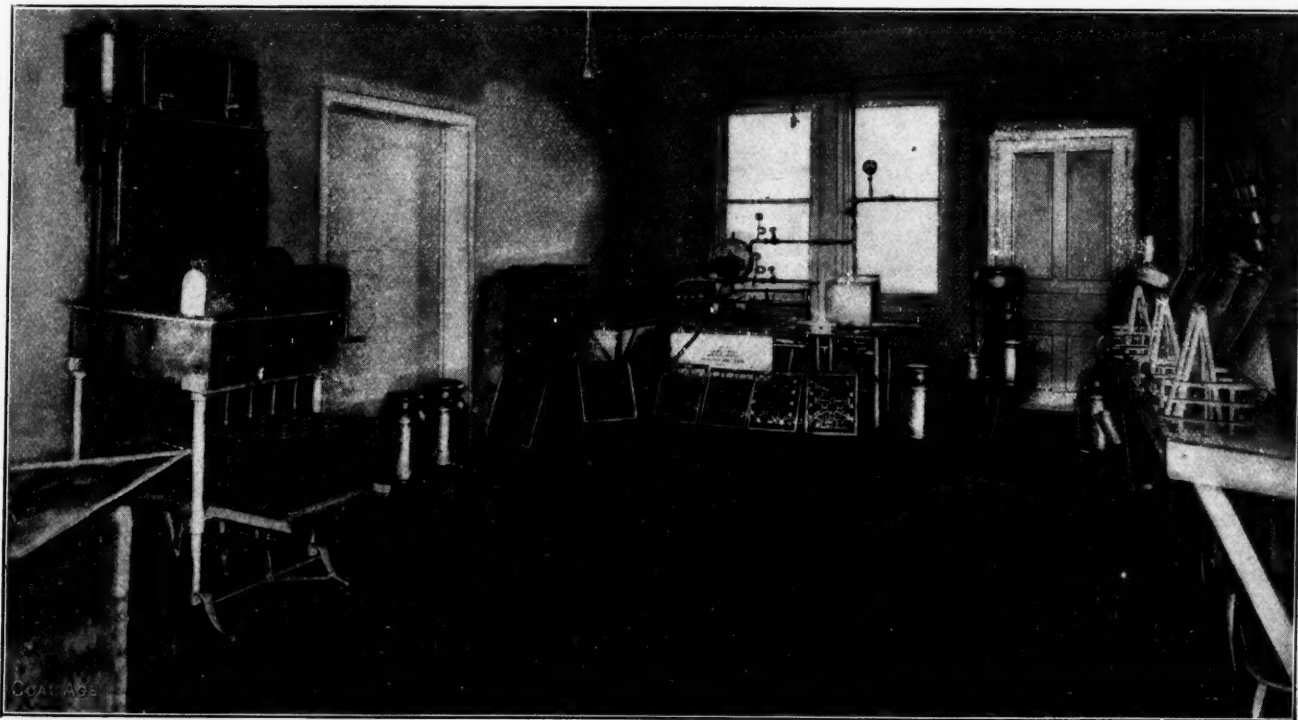
The Heilwood Co. is a corporation running a store at Heilwood, Penn. It is believed to be controlled by the stockholders of the Penn-Mary Coal Co., a subsidiary of the Maryland Steel Co., which has its offices and houses in that village. The store company does not, however,

project, in that instance, has been conducted, I understand, at a considerable loss because the miners prefer to buy their milk from other and less desirable sources.

A \$15,000 PLANT

The Heilwood Co. has signed a 20-year lease with the Penn-Mary Coal Co. for some 400 acres of farm land. It has erected the modern dairy plant shown on the front cover and is now prepared to supply milk to all the miners. The plant, when entirely complete, will cost about \$15,000.

The cowbarn measures 40x130 ft., and is finished with floors and feeding troughs of concrete. Drinking water can be turned into these troughs when needed. The stalls are built of steel pipe, as are also the stanchions by which the cattle are secured. Each stanchion consists of two pipes about 5 ft. long, set just far enough apart to hold the head of a cow. These pipes approach each



INTERIOR OF THE MILK ROOM AT THE DAIRY OF THE HEILWOOD COMPANY

make any collections on the coal company's rolls and the miners buy where they will. As prices are reasonable and the line of goods of a high order, the Penn-Mary employees do not avail themselves of their opportunity to purchase elsewhere, and being men of a good class, they are appreciative of the innovations in merchandising which the Heilwood Co. has developed for their advantage.

I make this statement regarding the personnel because the experiment has been tried elsewhere without success, at the suggestion of a well known Philadelphia philanthropist, owning stock in another coal company. The

other at either end and are arranged with swivels above and below. The cow's head can slide up and down in the stanchion and the animal can turn her head through a large angle without restraint and yet is absolutely secured by the framework. She can lie down or rise at will. In fact, the method of securing the animal's head is sanitary, safe and humanitarian, and probably would be equally available for use in mule stables.

HOLSTEIN-FRIESIAN STOCK

In the foreground of the picture illustrating the cowbarn are the box stalls for the calves and bull. In the

rear are single stalls for the grown cattle. There are 32 milch cows at present; 19 of which are giving milk and there is room in all for 50 cows. All but one of the present herd are of Holstein-Friesian stock, and it is altogether probable that after the weeding-out process has been completed and the herd is well balanced, the milk production will gradually increase.

The second floor of the barn is divided into two compartments; one for hay and the other for a feed room. On the one side of the main building are twin silos, two large towers which can be seen in the picture of the exterior of the building. Each holds 150 tons of ensilage. They are connected by an entryway to the barn proper. Between the main barn and milk house, to the left of the silos, a passage 8x14 contains a room in which milkers change clothes and another with a milk scale and a lavatory.

THE COW HOSPITAL

The smaller barn is an emergency building. It contains six box stalls for sick cattle. It is almost entirely empty at present, having only one cow in it, and that is only in the hospital because she is about to become fresh. There are diseases among cows like cow-pox, which are exceedingly infectious, but which cannot be transmitted to human beings except by inoculation. It is necessary to have an emergency building for such cases, if any should occur. The cows having tuberculosis will, of course, be killed. In this same building are the boiler room and coal bins. The entire plant is lighted by electricity.

SANITARY MILK AT EIGHT CENTS A QUART

The production of certified milk is a comparatively small industry and it is still only in its infancy, for it is certain that before long such milk will be the only kind sold in the larger cities. The retail price of certified milk in Philadelphia and Pittsburgh is 15c. per quart, while commercial milk sells at 8c. The Heilwood Co. is marketing its product at the lower figure, so it will be seen that only a narrow margin is left for profit.

Absolute cleanliness at every stage marks the production of the Heilwood milk. First of all the cows must be free from disease. They are tuberculin-tested and passed as perfectly healthy animals by official veterinarians, recommended by the dairy division of the Department of Agriculture, at Harrisburg, Penn. Any cow found to be diseased is immediately isolated and if the malady is found to be in an advanced stage, the animal is killed at once.

Barns must be sanitary in construction, well ventilated and clean. Cleanliness in this connection means the daily removal of any contaminating filth. It also involves the employment of expensive and responsible labor. Pure running water must be accessible at all times and only persons of good health and clean habits should be allowed to work in the milk room. All milkers are required to wear clean white duck suits when milking.

HOW THE MILK IS KEPT FREE FROM POLLUTION OF COW AND AIR

When a cow freshens, all the long hairs are clipped from the udder, inside of the hind legs and part of the tail. Before milking, the udders are washed clean with warm water and all milking is done into sanitary pails,

having two layers of strainer cloth over the top. Each cow's milk is weighed as soon as it is drawn and is emptied into a large funnel, which conveys it through the wall to the cooling tank. In this funnel is a large mass of absorbent cotton, through which the milk filters into the cooler.

Through the pipes in this tank passes a continuous stream of fresh water at a temperature of 45 deg. F. This eliminates the animal heat from the milk and prevents the multiplication of bacteria, some of which would be harmful to life. As the milk cools it is allowed to drip slowly through two or more layers of gauze or strainer cloth and goes into the bottling machine through a wire cloth strainer and is fed into sterilized bottles. It is then put in a cooling room, kept at an even temperature by the ammonia system of refrigeration, and delivered to the consumer in a condition such that it will be maintained sweet and pure for twice the length of time that common milk can be kept.

HIGH PERCENTAGE OF BUTTER FATS

Tests prove that the milk averages 4.4 per cent. of butter fats, which shows that it is of a very fair quality. In the village of Montclair, N. J., just outside New York, where a most diligent campaign for good milk has been conducted for many years, only one firm out of the dozen doing business in 1911 had as good a record for richness of milk as the Heilwood Co. Certified milk is required to have over 3.5 per cent. of butter fats.

It must be free from any disease germs and should contain only the harmless bacteria found in all milk. All these germs multiply very rapidly when the animal heat is retained in the milk, and when it is exposed in open vessels. It is owing to their presence that milk sours quickly. It is known that commercial milk contains ten times as many germs as are found in the certified product.

All pails and utensils used in the handling of the milk are sterilized daily in live steam, even to the milking stools. Ventilation is secured by the King system. Each cow stands on a cork-brick floor covered with sawdust. Once a day, all the cows are curried and brushed, litter and bedding being removed every morning. Eventually the floor will be covered daily with a sprinkling of land plaster or cheap lime as a deodorizer and disinfectant. This will be removed with the litter.

MILK FOR BABIES AND INVALIDS

The Heilwood Co. is selling milk especially for babies. This milk is supplied by cows which are fed on simple food, excluding oil cake and like heating foods. Two cows, whose milk runs low in butter fats, have been selected, and their milk is marketed especially for babies and invalids. For this a charge of 10c. per quart is made. The babies which have been fed on this milk have shown remarkable improvement.

It is the purpose of the company to keep a detailed account of the cost of running the dairy, though the large amount of work involved hitherto in starting the plant has caused all attention to be directed to building, sanitation and marketing. In the coming year, the company expects to run truck and stock farms. The cost of living is increased throughout the country by the fact that many coal companies hold idle large acreages of land, which they could make generously productive, but

which they either keep idle or rent at rates which barely pay the taxes, to tenants who try to extract the last vestige of nitrogen from the soil without regard to the future. The action of the Heilwood Co. is therefore to be welcomed.

The manager of the store company is J. M. Thompson, who is also in charge of the farm. E. E. Blackburn, a graduate of State College (1912) is in immediate charge of the dairy project. Two men deliver the milk through the town of about 3000 inhabitants, and one man does the rough chores around the plant.

❖

The Nova Scotia Steel and Coal Co.'s Car

SPECIAL CORRESPONDENCE

The death rate in Canada has not been enlarged by any great fatality in the Nova Scotia mines, but this has not prevented the Nova Scotia Steel & Coal Co. and other nearby corporations from providing a complete system of protection for their mines. In fact, no other company in Canada except its neighbor, the Dominion Coal Co., is so well fitted for fighting mine fires and for rescue work after an explosion, as is this Nova Scotia company.

THE RESCUE CAR

It formerly kept its apparatus in a room in the general office building, but the equipment is now transferred to a railroad car, which is always ready to go to any col-



FIG. 1. THE MIDDLE SECTION OF THE NOVA SCOTIA STEEL & COAL CO.'S RESCUE CAR

lieries in the province with which railroad connections can be made. The car is a remodeled passenger coach divided into three sections. Two of these are illustrated in this article; the third, at one end of the car, is for the use of the rescue corps during travel. It is fitted with seven seats and a lavatory.

The middle section is shown in Fig. 1. On the left, in the foreground, is a long closet with two doors for the accommodation of Draeger apparatus and clothing for the rescuers. On the floor at the rear left is an oxygen pump and still further back a switch board and table for charging the hand electric lamps. Above the closet, the plans of the mines and of the various water systems are kept ready for use.

Above the rear door leading to the third section are a row of electric lamps and three oil safety lamps for gas

observation. In the rear on the right is the surgical case with the pulmotor at its foot. Several Draeger helmets are hung on the right wall of the car with oxygen tanks adjacent. Below this are the regenerating apparatus which are carried on the backs of the rescuers. In the foreground on the same side is a desk with a telephone.

SURFACE FIRE-FIGHTING EQUIPMENT

The second illustration shows the section equipped for fire fighting. The large doors on the right and left are hinged at their lower edges so that when let down they furnish a suitable runway for the hose reel in the rear. It will be noted that these doors are slatted horizon-

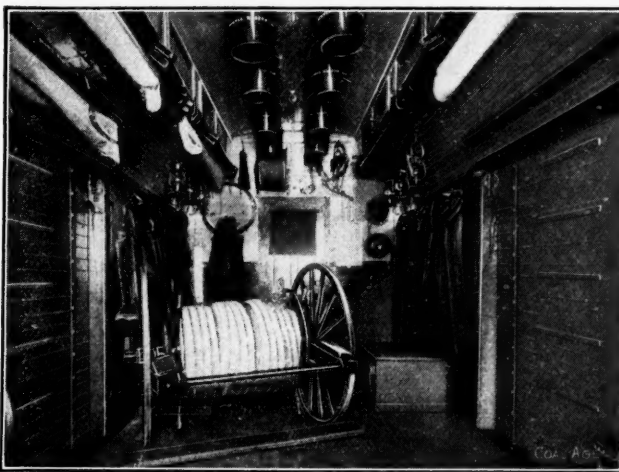


FIG. 2. THE END OR FIRE-FIGHTING SECTION OF THE NOVA SCOTIA CAR

tally so as to make it possible to travel up them when they are on a steep slant. At the same time the slats are so short that the hose cart clears the ends of the strips.

The walls wherever available carry firemen's coats, boots and fire helmets. The roof is hung with stretchers, lanterns, wire, rope and fire buckets. On the floor to the right are a tool box and a "three-hole" oil stove, the latter not being visible in the photograph.

THE EQUIPMENT

In all there are 15 sets of Draeger-helmet rescue apparatus, and one of the Ever-Ready mouthpiece type, 24 oxygen cylinders, 2 oxygen-refill pumps, 1 pulmotor, 2 dozen electric safety lamps, 1 electric charging device for the electric-lamp batteries, 1 Draeger oxygen reviving box, 6 ordinary respirators, 1 set of portable telephones and some canaries. Of the 24 oxygen cylinders only seven are carried in the car, the others being stored as an emergency supply. These cylinders contain 100 cu.ft. of oxygen at a pressure of 125 atmospheres.

A smoke house has been constructed in a central location. It is so built that the head trainer can observe the men from outside as they perform their evolutions. At present there are about 40 men, including the officials of the collieries, who are trained in the use of rescue apparatus. In addition to this number, 24 of the officials hold certificates of proficiency in first aid.

There are ambulances, stretchers and blankets at each colliery, and in the rescue car there is a first-class ambulance for the conveyance of injured men from the car to the hospital or to their homes.

DISCUSSION BY READERS

Timbering at the Working Face

Letter No. 1—This subject is of the greatest importance with respect to the safety of the miner, the conservation of the coal, cost of production and economy of time and labor; although the timbering of the working face is primarily for the protection of the workman. For the most part, post timbering is employed. The province of a mine post is twofold: First, to give support to loose pieces of overhanging slate or rock; and second, to give suitable warning of any movement of the roof and the danger that is imminent. In post timbering, the time and place of setting posts are items of more importance than the number of timbers set. There must be no delay in setting a post under a loose piece of roof slate; or, better still, the loose piece should be pulled down at once. The manner of setting posts or style of timbering adopted will depend on many conditions, such as the character of roof and floor, thickness and character of coal, size of opening and length of time the place must be kept open.

A strong slate or shale roof will generally have a good bending factor. In my opinion, such roof requires a systematic method of timbering, which should be rigidly maintained. The posts should be set a constant distance apart every way. This will enable a large percentage of the posts to be recovered when the room is finished and the pillars are being drawn back. In all cases, it is important to keep the timbering within as short a distance of the working face as practicable.

Since a good, strong slate or shale is generally considered the safest kind of roof, in coal mining, its proper support is too frequently neglected by the miner, and this neglect is not regarded as serious by most mine foremen. An experience of 20 years in the superintendence of mines has convinced me that this is one of our greatest dangers in coal mining; and the reports of mine accidents, both fatal and nonfatal, in all states, bear out this conclusion. Many times I have seen a space 20x30 ft. left wholly unsupported, under a strong roof slate, while miners still continue to advance the face of the coal. Frequently, such neglect will result in a fall of roof sufficient to close the place before it has been driven 30 yd., causing both a loss of coal to the company and loss of time and labor to the miner.

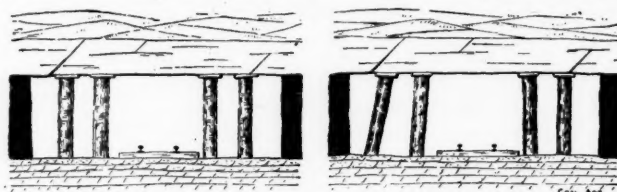
A soft, friable roof, or a drawslate that disintegrates by exposure to the air or by reason of the increasing roof pressure, or a roof containing slips or faults, or one of a fireclay nature is always more or less dangerous. An example of such roof is found in the Pittsburgh seam. This seam, in West Virginia, is soft and friable; and, in the mines of the lower Kanawha region, must have careful attention to insure safety and economy in mining. I think this fact is clearly shown by the state inspectors' reports of these mines.

Mine roof of the character just mentioned requires a practical system of timbering adapted to the special conditions of the roof and coal and the pressure exerted by

the overburden. In the mines of the Kanawha region, there are few if any foreign miners employed. The mine officials are careful; a good system of inspection is maintained; and any failure to properly timber the face results in "stopping the turn" of the miner. As a result, under this treacherous roof, there are comparatively few nonfatal accidents, while the fatal accidents, which are mostly unavoidable, do not exceed the general average for the state.

In my opinion, a large percentage of accidents due to falls of roof and coal can be ascribed to what may be called the "personal equation." It is stated with some truth that probably 50 per cent. of the falls at the working face may be ascribed to the neglect of mine foremen in seeing that their orders, in respect to timbering, are properly obeyed. It has been my duty, frequently, to take mine foremen to task for their lack of discipline in this respect; but the excuse is always, the "scarcity of men" and the "demand for coal."

I want to refer to a peculiarity of the roof in this region, which I have found requires special treatment. Frequent slips occur in the roof slate here, and the general practice among the miners is to set their posts vertical,



A SUGGESTION IN TIMBERING ROOF SLIPS OVER ROADS

on each side of the road in the rooms, as shown on the left, in the accompanying figure. This invariably causes the slate to break over the roads, which gives no end of trouble. I have found that this difficulty may be largely avoided by setting the first post, next to the road, slightly inclined toward the roadway, and the post behind this, more inclined in the same direction, as shown on the right of the same figure. The advantage is twofold; namely, a break in the roof is resisted by the full thickness of the slate and the inclination of the post tends to arch the weight over the roadway.

Many miners and a large number of foremen know of but one way of setting a mine post, and that is in a vertical position, without regard to the conditions existing in the roof or the seam. I am proud to say, however, that the majority of our good foremen know that the proper position of a mine post is in line with the pressure.

The fireclay formation overlying much of the coal, in the Connellsville coke region and in various parts of the United States and Canada, is a hard roof to handle, except where the coal is thick enough to leave a top bench for roof when driving the rooms up to the limit or, as we say, in the "first working." This top coal forms a good roof and can be taken down when the pillars are drawn back. In a thin seam having no top bench, it is often necessary to resort to crossbar timbering.

A sandstone roof is likewise a dangerous roof. The roof stone often contains joints and irregular fractures that give no warning of their presence. Mine posts are of little use under such a roof, except for giving some slight warning of danger, which, however, often comes too late. This roof breaks in massive pieces, which, when they once start to move, cannot be held except by building substantial cribs. I have seen hundreds of cases where the attempt has been made to hold up a large roof rock that required constant retimbering and was still a constant menace to safety. Time, labor and material are generally saved by allowing such a rock to fall and finding a way around it. When this cannot be done, it should be cribbed and crossbarred in such a manner that cars cannot knock out the timbers and cause an accident.

My experience has taught me that this class of accidents, in the past, has been largely the result of a lack of proper supervision. What has already been accomplished in this direction, proves that perhaps 90 per cent. of these accidents could have been avoided by a system of careful inspection of the roof. Operators now very generally realize the importance of regarding *safety first* and *profits second*. This was the experience, formerly, in England. The district where I worked (1872) was notorious for accidents from roof falls. When the Coal Mines Regulation Act became a law, in that year, roof inspection was made compulsory, with the result that, in five years, this class of accidents was reduced 50 per cent.; and, if my memory serves me right, this reduction gradually increased to 80 per cent.

While it is true that the neglect of miners to properly examine their own working place before going to work and to promptly set any timbers that may be required and, likewise, the neglect of mine officials and bosses to give sufficient time for a thorough inspection of each working place, will account for many accidents, the larger responsibility rests upon the operator for the maintenance of proper discipline in the mine. This responsibility is shared in part by the mine foreman. The discussion of this question in COAL AGE cannot fail to impress the responsibility for proper roof inspection upon every mine worker, foreman, superintendent and operator.

JOSEPH VIRGIN.

Bancroft, W. Va.

Ventilating Breasts in the Mammoth Seam (Penn.)

Referring to the article of Mr. Crankshaw, COAL AGE, Feb. 15, p. 263, in which he describes the method of ventilating the breasts in the Mammoth seam, by separate air splits, I was surprised that no crossheadings are shown connecting the breasts.

The system of mining described is what is known as "rock chute mining." The system of ventilating by splits is good, with the exception that crossheadings should be driven between the chambers or chutes every 60 ft., or less if the conditions require. In the first split to the left, the air current taken up chute No. 5 should not be made to return by that chute to the airway; but should be conducted through the upper crossheading to the face No. 4, from which it should pass through another crossheading to No. 3 and so on, returning to the airway through No. 1 chute.

In the same manner, each air split should be conducted along the faces of the several chutes or breasts, by passing through the crossheadings connecting the chutes near the face, and only returning to the airway by the last chute in that split. To course the air up one side of the chute and down the other, ventilating in this way several breasts without crossheadings, is not in accordance with the best accepted laws of ventilation. Experience has taught us that seams of any considerable inclination should be ventilated, as far as practicable, so that the course of the air will be generally toward the rise; in other words, the ventilation should be *ascensional*. This system should be adopted in all mine ventilation whenever practicable.

By driving crossheadings every 60 ft. or less, between adjoining chutes, the course of the air is much shortened and the mine resistance reduced, which will increase the circulation of air, for the same power. Again, it would be impracticable to drive breasts any considerable distance, either in flat or pitching seams, without crossheadings connecting them, and it would be difficult to remove any accumulation of gas from such breasts and much time and labor would be lost, besides running a risk of gas or dust explosions.

The statement that "if one breast makes gas freely it can be isolated from the other breasts on that split without shutting down the whole gangway" is true; but, in the majority of cases, this would not be necessary if the circulation in each split was properly arranged and the air current conducted through the crossheadings as explained.

Good ventilation at the working face is one of the important factors in the economical operation of a mine; as, thereby, many long delays are avoided, which would otherwise greatly reduce the output and increase the operating expense.

DANIEL J. BOYLE.

Fern Glen, Penn.

Danger of Powder Smoke

The danger from powder smoke is greater than miners commonly suppose. In one of the recent letters discussing the reducing of the ventilation when firing, I was glad to see a reference to the explosibility of powder smoke. (COAL AGE, Feb. 1, p. 196.)

In some mines, the miners have a practice of rushing back to the face immediately after a shot has been fired, so as to light the smoke behind the standing shot before this smoke has mixed with the air to such an extent that it will not ignite. I have often thought the practice should be stopped, as the miner not only runs the risk of being burned, but the shot may have knocked out a prop, leaving a loose piece of slate that is ready to fall at any moment.

Firedamp is not the only danger in mines and I believe it is a great mistake that one or more firebosses are not employed, in every mine, whether gas is generated or not. There are many accidents of this class that a competent fireboss could prevent, in a large mine where it is a practical impossibility for the mine foreman to give proper attention to many of these matters.

WILLIAM ROTHWELL.

Fireboss.

Castle Gate, Utah.

Seven Shifts a Week

I have noticed recently the discussion of the question of working seven shifts a week and want to say that, while we cannot altogether avoid Sunday work at a coal mine, I have never advocated the practice of working seven days in the week. I think there are many jobs set aside for Sunday that could be done as well during the week. I presume I have been "on the job" as many hours as Mine Foreman, COAL AGE, Feb. 15, p. 272; but I have never regarded it as "living on the job."

When a man has worked for me two shifts running, I would not give him 50c. for a third shift. Many men want to work extra time, but it is more the *time*, on the pay sheet, they are after, than the work they assay to accomplish. More and better work is always done by observing regular hours; begin on time and quit on time is generally good doctrine. Men should be allowed to make extra time, only when this is necessary for the continuous operation of the mine. When the work requires, it is all right to put in an extra shift on Sunday or any idle day, although this may cause unexpected trouble.

I have known men to be so anxious to make extra time, that they have called the attention of the mine committee to the fact that they were not employed on certain extra shifts, disregarding the right of the boss to employ such men on an extra job as he considers most capable of doing the work.

While I consider it necessary that any man in charge of the work should be ready to respond to a call at any time, I do not think it is necessary for him to eat and sleep with the job. Extra time is often made at the expense of efficiency and with loss to the company.

AN INDIANA FIREBOSS.

West Terre Haute, Ind.

High Fan Efficiency

Referring to your editorial "Too High an Efficiency," COAL AGE, Feb. 22, p. 306, I infer you do not fully understand the methods that were employed to determine the amount of air exhausted by the fan during the test.

The measurements taken by the Hydro recording gage were not relied upon solely in calculating the results, but the amount of air passing was measured simultaneously by three methods as follows:

(A) By Hydro recording gage; the pitot tubes attached to this instrument being fixed permanently in the main airway, at a point in the cross-section, where the average velocity was obtained.

(B) By an anemometer in the main airway.

(C) By an anemometer in each of the three airways leading to the main airway.

It is, of course, well known that the velocity of the air is not the same in all parts of the airway; that the points where the average velocity occurs remains unchanged for different velocities, has also been established. To determine the point of average velocity, the main airway was divided by wires into sixteen sections and repeated readings taken in each section with pitot tubes attached to a portable recording gage, the dial of which was graduated to read velocities in feet per second. The pitot tubes of the Hydro gage, used during the test, were fixed permanently at the point of average velocity thus determined, and readings taken on both instruments were found to check very closely.

The three splits were sectioned and readings taken consecutively in adjacent squares. In the main airway, the anemometer was moved crosswise at the same height as the pitot tubes. These airways are concrete lined; during the test they were lighted by electric lamps and the time was announced by electric bells, offering the best possible facilities for accurate work. A deduction of six square feet for each operator was made from the sectional area of the airways. The water gage shown by the Hydro recording gage was also checked by two water manometers on opposite sides of the fan drifts. By this method of taking measurements, the volumes of air measured in the main airway should check with each other and also with the total volumes measured in the three splits.

The results of an average test were as follows:

Volume in cubic feet per minute: (A) 322,410. (B) 306,620. (C) 302,550. The water gage was 4.89 and the calculated mechanical efficiencies of the fan 83%, 77.6% and 76.6%, respectively.

The above results are typical and, considering the difficulty and the chance of error in taking anemometer readings in large airways, are probably as close as could be expected.

With the above facts understood, I think it must be admitted that the results of the test are reasonably near the truth, or that all the instruments were inaccurate in the same direction, which is hardly probable.

Good efficiency would naturally be expected of this fan, with its long evasé chimney and low inlet velocities and, granting that all the observers were deceived a reasonable amount, the efficiency would yet be in excess of that obtained in the laboratory experiments mentioned in your first editorial, Feb. 1, p. 193.

U. U. CARR.

California, Penn.

As all fan engineers know, there are fan tests and fan tests. An important feature in every practical fan test, that is to say, in every test of a fan under working conditions at the mine, is to eliminate other factors acting to assist or oppose the general circulation of air through the fan and in the airways, of which the fan-ducts must be considered a part. This is one of the most troublesome features of such a test, and one that is often unconsciously overlooked, and for which the high efficiencies obtained are often responsible.

Because a certain fan shows a high efficiency, say 80 per cent., or even higher, it does not follow that these troublesome features have not been fully considered and eliminated by the engineers in charge of the test. The writer has made tests in which such high efficiencies were obtained, and is, therefore, of the opinion that they are possible.

In speaking of fan efficiency, it is generally recognized by engineers that such efficiency includes the efficiency of the engine driving the fan, and is the ratio of the power on the air, as measured in the fan drift, to the indicated horsepower of the engine card. The attempt is seldom made to separate these factors, while at the same time it is recognized that an engine of poor design and low efficiency may seriously handicap the ventilator and reduce the efficiency that should be obtained.

The letter of Mr. Carr shows clearly that the test to which he refers was carefully conducted, and the efficiency claimed for the fan is a proper one, barring the unsuspected operation of air columns in the mine.—EDITOR.]

EXAMINATION QUESTIONS

Mine Gases and Ventilation

Ques.—If a water gage of 2 in. produces a velocity of 500 ft. per min., in an air course 4000 ft. long, what water gage will be required to produce a velocity of 800 ft. per min., in the same airway extended to a length of 8000 ft.?

Ans.—In this case, the sectional area and the perimeter of the airway remain unchanged, while the length of the airway is doubled. Since the pressure per square foot varies as the length of the airway and the square of the velocity, the *pressure ratio* will be equal to the *length ratio* multiplied by the square of the *velocity ratio*. Therefore, calling the required water gage x , we have

$$\frac{x}{2} = \frac{8000}{4000} \left(\frac{800}{500} \right)^2 = 2 \left(\frac{8}{5} \right)^2 = \frac{2 \times 64}{25} = 5.12 \text{ in.}$$

Ques.—If a water gage of 1.2 in. produces a velocity of 500 ft. per min., in an airway 6x8 ft., 1 mile long; what water gage will be required to produce a velocity of 750 ft. per min. when the length of this airway is increased to 2 miles?

Ans.—As in the previous example, the sectional area and the perimeter of the airway remain unchanged while the length of the airway is doubled and the velocity increased from 500 to 750 ft. per min. The area and perimeter of the airway being constant, the *water-gage ratio* varies as the *length ratio* times the square of the *velocity ratio*. Therefore, calling the required water gage, in this case x , we have

$$\frac{x}{1.2} = \frac{2}{1} \left(\frac{750}{500} \right)^2 = 2 \left(\frac{3}{2} \right)^2 = \frac{2 \times 9}{4} = 4.5 \text{ in.}$$

Ques.—If a certain pressure produces 20,000 cu.ft. of air per minute, in an airway 6 ft. in diameter; what quantity of air will the same pressure produce in an airway 12 ft. in diameter, assuming the airways have equal lengths?

Ans.—In this case, the pressure and the length of the airways are constant. Since both these airways are circular, they are similar and the square of the quantity of air passing varies as the fifth power of the diameter of the airway. In other words, the square of the *quantity ratio* is equal to the fifth power of the *diameter ratio*. Therefore, calling the required quantity of air x , we have

$$\left(\frac{x}{20,000} \right)^2 = \left(\frac{12}{6} \right)^5 = 2^5 = 32$$

$$x = 20,000 \sqrt{32} = \text{say } 113,000 \text{ cu.ft. per min.}$$

Ques.—The total rubbing surface of a square airway being 160,000 sq.ft., the length of the airway, 5000 ft., and the quantity of air passing, 80,000 cu.ft. per min.; find the velocity of the air current, in feet per minute.

Ans.—First find the perimeter of the airway by dividing the rubbing surface by the length of airway; thus, $160,000 \div 5000 = 32$ ft. But the airway being square, each side is $32 \div 4 = 8$ ft.; and the sectional area of the airway is then $8 \times 8 = 64$ sq.ft. Now, find the velocity of the air current by dividing the quantity of air

in circulation by the sectional area of the airway; thus, $80,000 \div 64 = 1250$ ft. per minute.

Ques.—Would you recommend a fan of furnace for a new shaft mine 500 ft. deep? Give reasons for your recommendation.

Ans.—If the seam is generating explosive gas, a furnace could not be used with any degree of safety. If the mine generates no gas, however, a furnace can be used to good advantage in the early development of the mine, as the depth of the mine below the surface would give an air column that would insure ample ventilation, for a considerable time to come.

As the development of the mine increased, however, a ventilating fan would be found to give better satisfaction and be more economical in the end. A furnace should not be used in any mine liable to dust explosion; for the reason that, in the event of an explosion, the circulation in the mine is under better control and the means of ventilation immediately accessible when a fan is employed.

Ques.—Find the entire rubbing surface of three airways each 6000 ft. long, and each having a sectional area of 75 sq.ft. The first airway is rectangular, its width being three times its height; the second airway is square, and the third airway is circular.

Ans.—The first step is to find the perimeter of each separate airway. Calling the height of the first airway h , its width is $3h$, and the sectional area is then $h \times 3h = 3h^2 = 75$ sq.ft. Then, $h = \sqrt{\frac{75}{3}} = \sqrt{25} = 5$. The first airway is, however, 5×15 ft., in section, and its perimeter is $2(5 + 15) = 40$ ft.

The second airway being square, one side is $\sqrt{75} = 8.66$ ft.; and its perimeter is then $4 \times 8.66 = 34.64$ ft.

The third airway being circular, its diameter is

$$d = \sqrt{\frac{75}{0.7854}} = 9.77 \text{ ft.}$$

and its perimeter or circumference is then $3.1416 \times 9.77 = 30.7$ ft., nearly.

Since the length of each airway is 6000 ft., the entire rubbing surface is

$$s = 6000(40 + 34.64 + 30.7) = \text{say } 632,000 \text{ sq.ft.}$$

Ques.—A volume of 10,000 cu.ft. of air and marsh gas is at its most explosive point; how many cubic feet of marsh gas does the mixture contain?

Ans.—A mixture of marsh gas and air, at its maximum explosive point, contains 9.46 per cent. of the gas. Therefore, a volume of 10,000 cu.ft. of this mixture will contain $10,000 \times 0.0946 = 946$ cu.ft. of marsh gas.

Ques.—Under what conditions may afterdamp become explosive?

Ans.—Afterdamp may contain unburned marsh gas (CH_4) or carbon monoxide (CO), either of which gases becomes explosive when mixed with a sufficient quantity of fresh air. Such an atmosphere may have a temperature sufficiently high to ignite these gases, should fresh air have access to the place where they are found.

COAL AND COKE NEWS

Washington, D. C.

Secretary Nagel just at the close of Congress has rendered a report covering the much discussed question, what was the effect of the advance in prices on anthracite coal and how far it was warranted. His investigators have reached the conclusion that the advance of prices took about \$9,000,000 out of the consumers in 1912, but that there was no good warrant for the action taken. This is the net result of the so called Difenderfer resolution which was presented and passed about nine months ago.

With reference to wages the conclusion is arrived at that the advance represented about 8 or 10c. per ton and was necessary in order to avoid strike conditions and insure a supply. This cost the companies about \$4,000,000. On the average, however, there was an advance of over 31c. per ton. Wholesale prices were increased on the average only about 26c. a ton, but when the advance in price is considered in connection with the change in sizes of coal it figures out at more than 31c. per ton.

The sources of profit to the companies were not, however, exhausted in a mere advance in price, but considerable gain was made by cutting off the discounts of 40 and 50c. per ton usually granted to consumers on purchases made in April and May. Altogether the total excess gathered in from the community was about \$13,450,000 more than would have been obtained had the same tonnage been sold at the old prices. Nearly \$11,000,000 of this sum came from the advance in prices and about \$2,500,000 from the suspension of the discount. There were also some profits made by sales of coal at famine prices in certain instances.

The report goes on to charge the existence of a trust including the mines and the railroads with which they are affiliated. As a result of this community of interest it is claimed that there is nothing in the mere fact that production costs somewhat more to warrant an increase of price to the consumer unless there is some very large advance to bring it about. "The capital invested in coal mining," says the report, "derives its income both from the mining and the transportation of the coal, and a failure to realize profits in the mines may be and often is compensated by the profit in the operation of the railroad on account of coal tonnage. The purpose is simply to operate the coal mines and the railroad so as to produce the maximum profit from both together and not simply to secure profitable results from each source of income separately."

Secretary Nagel is quite severe in his strictures on the retailers, as he asserts that they took large advantage of the increase in cost and were often responsible for the suspension of the discounts. He cites New York, Philadelphia and Washington as places where the retailer shifted the full amount of the increase demanded by the operators, and perhaps something more, to the shoulders of the consumer. He adds that in each of the cities mentioned the increase in retail prices was very similar to the advance in the circular prices quoted by the operator.

This report, of course, comes too late to serve as a basis of any legislation by Congress at the session which closes Mar. 4, but it is expected that the subject will promptly come up again during the special session which has been called for the present month. Specifically, it is believed that the showing made will lead to the removal of the tariff on coal as has already frequently been predicted.

Winston-Salem Rate Decision

In a decision issued by the Interstate Commerce Commission on Feb. 25, it was ordered that the case of the Board of Trade of Winston-Salem against the Norfolk & Western R.R. should be dismissed. The Commission held that the rate of \$2.10 per ton on coal from the Pocahontas fields in Virginia and West Virginia to Winston-Salem is not unreasonable. The Commission, however, concluded that the rate of \$2 per ton from the same point of origin to Martinsville, Virginia, is excessive to the extent that it exceeds \$1.80. The roads were ordered to put the latter rate into effect by Apr. 15.

The Commission further held that the Chicago, Milwaukee & St. Paul and other railways had failed to justify the pro-

posed advances in the rates on coal in carloads from mines in Iowa to stations in South Dakota, North Dakota and Montana. The tariffs were ordered withdrawn. A similar decision was reached with respect to the proposed advances on the rates for soft coal in carloads from Illinois mines to Clinton, Ia., and other points on the Chicago, Burlington & Quincy R.R. The Chicago & Alton and other roads were ordered to withdraw their suspended tariffs not later than Apr. 15.

PENNSYLVANIA

Anthracite

Scranton—At a conference with the officials of the Scranton Coal Co., Feb. 20, the 300 striking miners from the lower seams of the Capouse colliery agreed to go back to work. Instead of returning, however, they not only stayed out, but induced 300 additional men to quit. As a result the whole colliery is idle.

Wilkes-Barre—A cave in the Pine Ridge mine of the Delaware & Hudson Co. at Miner's Mills, Feb. 20, caused the cellar of a house belonging to James Flynn to sink. The house was immediately vacated.

An attempt to call a strike at the Avondale Colliery of the D. L. & W. Coal Co., in Plymouth Township, has resulted in the mine being closed indefinitely, while repairs are being made to the breaker and the mine workings. The subject of disagreement was the price for standing timber, the men claiming that the price had been reduced, and the foreman showing his books to prove that no reduction had been made. The evidence of the books was satisfactory to the members of the committee, and they announced their readiness to return to work the next day, only to be met with the statement by the superintendent that inasmuch as they had quit and thrown the colliery idle contrary to their agreement, work would not be resumed until the long contemplated repairs had been made.

Pottsville—The miners who were entombed, Feb. 25, in a colliery near Mahanoy City were rescued early Feb. 28. Two of them were completely exhausted and had to be dragged through a small aperture, which had been made during the last 10 ft. of digging in the wall. The men were without food for 58 hours, and their clothing was soaked with icy water.

Bituminous

New Kensington—While trapped in a fiery mine of the Valley Camp Coal Co. at Valley Camp, a searching party narrowly escaped death. Four of the party of 10 were badly burned by an explosion and three of these are now in the hospital. Three hundred men employed on the day shift were warned in time to escape, but it is feared that there may be others in the workings.

DuBois—Nearly 700 men employed at the Eriton shaft of the Northwestern Mining & Exchange Co. have gone on strike. It is said that the weighing methods employed at the colliery are the cause of the trouble.

California—Three men were seriously injured Feb. 25, in the mines of the Vesta Coal Co. Two were caught in a fall of slate while a third had his right arm torn off by an electric cutting machine.

WEST VIRGINIA

Charleston—General Elliott, commanding the troops in the martial law district has reported to Governor Glasscock that the mines in and out of the country covered by the National Guard resumed operations Feb. 18. This is taken to indicate that the crisis has passed and that peace will soon be restored. No arrests have been made as yet in connection with the burning of the tippie of the M. B. Coal Co.

Fairmont—Karl F. Schoew, state mine inspector for the first district, is an applicant for the position of chief of the department of mines of the state of West Virginia, to succeed John Laing, whose term expires June 30.

OHIO

Columbus—One of the most important events in coal circles during the past week was the enactment by the Ohio legislature of the Green compulsory workmen's compensation bill, which will apply to every coal mine in the Buckeye State. Effective after Jan. 1, 1914, every individual, firm or corporation which employs more than five people must pay into the state board of awards a premium based on the yearly pay roll,

which is calculated to take the place of liability insurance and to compensate all workmen for injury or their dependants for loss of life. The law provides for a schedule of compensation to be paid to workmen injured by the loss of members. For partial disability, the injured laborer is to receive two-thirds of his weekly wage, providing it does not exceed \$12 weekly for a term of six weeks. For permanent disability he is to receive two-thirds of his average weekly wages for life, providing it does not exceed \$12 weekly. Employees of less than five persons can come in but are not required to do so. The law will make quite a change in the system of operating mines in Ohio.

The Ohio legislature has also passed a bill giving heirs instead of lineal descendants the right to recover damages caused by death in the mines of Ohio.

KENTUCKY

Louisville—Recent rains throughout the Ohio Valley have resulted in a rise in the river, which is expected to bring a stage of water from Pittsburgh down that will enable the coal fleets to get out with the biggest tonnage in years. Tows are now being made up at Louisville for several of the steamers, which have recently returned from the South with empties, the quantities of river coal now available at this port being ample for this purpose.

The decision of the Interstate Commerce Commission makes permanent the recent suspension of the Louisville & Nashville's advances in rates on coal from mines on the Stony Fork branch to various destinations. The decision upholds also the contention of the coal men that the L. & N. is legally the initial carrier, and is, therefore, responsible for the furnishing of cars.

ILLINOIS

Edwardsville—The Henrietta Mine, owned by the Federal Trust Co. of St. Louis and leased by W. S. Walker, was shut down by action of the miners filing claim for wages. The management claims that the mine was unable to work, because the people of Edwardsville bought outside coal instead of patronizing the local mines.

Cherry—The last death claim against the St. Paul Coal Co. arising out of the mine disaster at Cherry in 1909 has just been settled in the circuit court at Princeton. It is estimated that the company has paid out over half a million dollars in settlements to date.

Peoria—The Illinois miners in state convention Feb. 25, voted to give the striking miners of West Virginia \$900,000 to aid them in their struggle. The gift not only means a levy of \$100,000 upon the members of the union in this state, but it authorizes the state executive board to spend every cent of the reserve fund of \$800,000 if necessary.

PERSONALS

Dr. J. H. Hughes, of Nanticoke, has received an appointment as first-aid advisor for the Susquehanna Coal Co. in Nanticoke and Glen Lyon to fill the vacancy caused by the death of Dr. F. L. McKee, of Wilkes-Barre.

Hiram Smith, general foreman at the Dorrnce colliery of the Lehigh Valley Coal Co., has resigned, and his place has been taken by Hugh Price, foreman at Mineral Spring colliery. James Weston, assistant foreman at the Dorrance, has been promoted to foreman at Mineral Spring.

N. W. Campbell, C. H. Peacock and S. L. Kinzer have resigned from their positions with the Pennsylvania Coal & Coke Corporation at the Philadelphia office. Their places will be filled for the present by E. S. Lawrence, assisted by N. C. Ashcom, G. A. Brown, H. G. Mettlach and W. J. Ryan.

The annual meeting of the stockholders of the Goulds Mfg. Co. was held at Seneca Falls, N. Y., Feb. 24. No change was made in the board of directors, and the following officers were reelected: President, N. J. Gould; vice-presidents, D. V. Colby, W. D. Pomeroy, W. E. Davis, W. E. Dickey; secretary, H. S. Fredenburg; treasurer, B. R. Wells; assistant treasurer, E. W. Medden.

RECENT COAL AND COKE PATENTS

Mine Door—N. Jacho, Allentown, Penn., 1,052,147, Feb. 4, 1913. Filed June 7, 1912. Serial No. 702,257.

Coke Oven—W. Feichs, Bethlehem, Penn., 1,051,875, Feb. 4, 1913. Filed Oct. 12, 1910. Serial No. 586,630.

Coaling Apparatus—F. E. Davis, Payette, Idaho, 1,051,699, Jan. 28, 1913. Filed May 11, 1912. Serial No. 696,796.

Mine Car Wheel—I. W. Jones, Birmingham, Ala., 1,051,892, Feb. 4, 1913. Filed Sept. 18, 1911. Serial No. 649,831.

Mining Machine—P. J. & J. S. Kelley, Pana, Ill., 1,051,417, January 28, 1913. Filed Feb. 8, 1911. Serial No. 607,598.

Steam Boiler Furnace—E. Buckley, Philadelphia, Penn., 1,051,546, Jan. 28, 1913. Filed May 27, 1912. Serial No. 699,914.

Mine Car Couplings—O. & C. Anderson, Bitumen, Penn., 1,051,536 Jan. 28, 1913. Filed April 5, 1909. Serial No. 487,852.

Conveyor—G. C. Horst, assignor to J. A. Jeffrey, Columbus, O., 1,052,253, Feb. 4, 1913. Filed May 14, 1903. Serial No. 157,160.

Mining Machine—J. McDonald, New Philadelphia, Penn., 1,052,359, Feb. 4, 1913. Filed March 14, 1911. Serial No. 614,417.

Loading and Unloading Apparatus—O. N. Gardner, Jamestown, N. Y., 1,051,994, Feb. 4, 1913. Filed March 15, 1912. Serial No. 683,972.

Process of Briquetting and Pressing Fuels—A. Ronay, Berlin, Germany, 1,052,093, Feb. 4, 1913. Filed July 21, 1909. Serial No. 508,784.

Superheater Boiler—J. E. Beel, Assignor to Babcock and Wilcox Co., New York, N. Y., 1,051,829, Jan. 28, 1913. Filed May 21, 1906. Serial No. 317,856.

Water Tube Boiler—D. S. Jacobus, assignor to Babcock and Wilcox Co., New York, N. Y., 1,051,890, Feb. 4, 1913. Filed Sept. 21, 1912. Serial No. 721,531. Also 1,051,891, Feb. 4, 1913. Filed Sept. 21, 1912. Serial No. 721,532.

Water Tube Boiler—A. D. Pratt, assignor to Babcock & Wilcox Co., New York, N. Y., 1,051,912, Feb. 4, 1913. Filed July 3, 1912. Serial No. 707,419. Also 1,051,913, Feb. 4, 1913. Filed July 3, 1912. Serial No. 707,420.

CONSTRUCTION NEWS

Middlesboro, Tenn.—The Mary Moose Mining Co. is preparing to sink a shaft at its mines, four miles below town.

Mt. Union, Penn.—The Lehigh Coal and Navigation Co. intends to erect 100 new houses at Summit Hill next summer instead of only 50.

Shamokin, Penn.—The local engineering department of the Philadelphia & Reading Coal & Iron Co. have completed plans for the sinking of a new shaft at the Sterling colliery.

Friedens, Penn.—A gigantic electric power plant has just been completed here for the Stauffer Coal Co. Many other improvements are being planned and will be carried out in the spring.

Coshocton, Ohio—The stockholders of the Ohio Cannel Coal Co., of Coshocton, Ohio, met recently to discuss plans for building a large number of houses and generally improving its property. The mines are located near Warsaw.

Birmingham, Ala.—A new crusher of 200 tons capacity, a new tippie and other machinery is being installed at the mines operated by the North Alabama Coal Iron and Railroad Co. Another slope soon will be started to tap another ore vein. Improvements will cost \$10,000.

Montreal, Can.—The Albert coal branch of the Grand Trunk Pacific R.R. has been completed and the work on another branch line to the Yellowhead Coke Co.'s mine is now well under way and will probably be finished by the end of the month. On a line to the Mountain Park mines, steel has been laid five miles west of Edson.

Columbus, Ohio—Reports from Bellaire say that extensive improvements are being planned on the property of the Rail & River Coal Co., recently purchased by the Grand Trunk R.R. The program announced will involve the expenditure of \$250,000 in the three mines of the company. When the proposed improvements are completed it is expected that 1500 more men will be employed.

Kansas City, Mo.—An English syndicate, headed by Col. L. B. Drage, of London, is to begin at once to develop the Christie coal tract in the Waverly-Lexington field. They propose to extend one mine that is now a small producer and to sink other shafts. They expect to be able to offer Kansas City several thousand tons of coal daily. Christie Tract, formerly the property of C. C. Christie, of Kansas City, is 2500 acres in extent.

Whitesburg, Ky.—It is reported that R. E. Echols and associates, of Huntington, W. Va., have been purchasing numerous tracts of coal lands in the Carr's Fork Creek section of Knott County, where their holdings will aggregate from 10,000 to 12,000 acres when deals now pending are completed. It is the intention of the purchasers to start development work during this year, which will involve the construction of a twelve-mile branch from the Lexington & Eastern's new extension.

Pottsville, Penn.—The Philadelphia & Reading Coal and Iron Co. is paying considerable attention to the improvement of its mines in the Shamokin region. The four-way shaft of the Reliance colliery at Beaverdale is being sunk, and when finished, will be 620 feet in depth. The Dolan Bros., of Pottsville have taken charge of the sinking and will push the work as rapidly as possible.

The Reading Co. expects to have this shaft completed within ten months.

The P. & R. C. & I. Co. will spare no expense to make this shaft one of the finest in the anthracite coal fields. It also intends in the very near future to have Reliance, Alaska, Locust Springs and Potts collieries equipped with electricity, motor cars, electric hoist and light. They will all receive the power from the electric plant at Locust Spring. The company expects to enlarge this plant and will ship in a few days a Corliss engine of 700 horsepower and one of the largest in that section. When completed this plant will be able to furnish power for all the collieries in that district and Potts colliery at Locustdale. At the Locust Spring colliery the work on the electric hoist at the new rock slope has been started.

Bluefield, W. Va.—The Virginian R.R. is making a survey along the water course of New River for a direct line from its present connection at Rich Creek, Va., to its subsidiary line, the Piney Creek R.R. The latter road was one of the several lines recently acquired by the Virginian. The cutoff extension will probably be seventy-five miles in length. Engineers are at present engaged in making estimates on this proposition and preparations will probably be made for actual work by the latter part of the summer.

Ft. Worth, Texas.—The development of coal fields in the northern part of Stevens County containing estimated deposits of 100,000,000 tons of coal and the construction of a railroad from Knox City on the Orient Ry. to this city will begin within a few weeks. The line will pass through oil lands aggregating 20,000 acres and located between Bomarton and Crystal Falls. The estimated cost of its construction is \$1,650,000. Six towns, Knox City, Munday, Goree, Bomarton, Throckmorton and Woodson have agreed to furnish the right-of-way for the railroad and land for stations, and to purchase coal from the newly discovered deposits to the value of \$750,000.

Connellsville, Penn.—Preparations are under way to increase the capacity of the Provident Coke & Mining Co.'s plant at the Kelly station, in the Allegheny Valley. The present output of the mine is 500 tons a day. This will be increased to 2000 tons as rapidly as possible. The company owns 3250 acres of land under which run three seams, the Upper and Lower Freeport and the Middle Kittanning. About 50,000,000 tons are contained in the tract and the coal is of excellent quality.

The plant is being electrically equipped. The West Penn Co. will furnish current for the haulage system, the cutting machines and other equipment.

NEW INCORPORATIONS

Hazleton, Penn.—The Cranberry Creek Coal Co.; capital stock, \$10,000.

Helena, Mont.—The Lock Bluff Coal Co.; capital stock, \$15,000. Incorporators: J. L. Wester, Jens Rivenes and Harry Wold.

Louisville, Ky.—The Schwind Coal Co.; capital stock, \$10,000. Incorporators: Ernest E. Schwind, John C. Schwind, Jr., and George Miller, Jr.

Hazard, Ky.—The Hazard Dean Coal Co.; capital stock, \$50,000. Incorporators: C. R. Luttrell, J. R. Jones, W. R. Marsee and Hiram H. Owens.

Wheeling, W. Va.—The Warren Coal Co.; to mine coal; capital stock, \$25,000. Incorporators: Johnson C. McKinley, Harry O. Willis, M. B. Mather and John C. Beury.

Wheeling, W. Va.—Warwood Coal Co., \$25,000. Incorporators, Johnson C. McKinley, W. R. Warwood, Harry O. Wells W. B. Mathes and John C. Berry, all of Wheeling.

Indianapolis, Ind.—The Warren Coal Co.; to operate mines; capital stock, \$100,000. Directors: William P. Ijams, Thomas H. Gill, Albert L. Pfau, Clem J. Richards, J. W. Ijams.

Charleston, W. Va.—The Claybrook Coal Mining Co.; to mine coal; capital stock, \$100,000. Incorporators: J. E. Chilton, John A. Thayer, S. B. Chilton, S. Hess and T. S. Clark.

Chicago, Ill.—The Lignite Products Co.; to mine lignite, coal, metals and other natural minerals; capital stock, \$5000. Incorporators: Charles Martin, T. A. Sheehan and H. M. Byall.

Chicago, Ill.—The Harkes Coal Co.; to mine and sell coal and clay and their products; capital stock, \$6000. Incorporators: Arthur Connor, Thomas J. Luney, Christopher Walen.

St. John, N. B.—New Brunswick Coal, Iron & Clay Co. is asking incorporation, with \$275,000 capital, to develop coal, iron and clay deposits and carry on business incidental thereto.

Fairmont, W. Va.—The Ross Coal Co.; chief works in Logan County; capital stock, \$75,000. Incorporators: C. E. Hutchinson, C. H. Jenkins, E. C. Curry, R. A. Johnson and H. M. Piermont, all of Fairmont.

Wilmington, Del.—The Octave Mines Co.; capital stock, \$1,000,000; to acquire mining rights of all kinds; acquire mining sites. Incorporators, George Steigler, W. M. Pyle, Edmund S. Hellings, all of Wilmington, Del.

Oklahoma City, Okla.—A charter has been granted to the Hillock Oil & Coal Co., of Weleetka; capital, \$100,000. Incorporators, Robt. F. Turner and J. H. Bynum, of Indianola, Okla., and M. H. Sharp, of Mena, Ark.

Hazard, Ky.—The Mabel Hill Coal Co. is a recent entry into the field around Hazard, Ky., the capital stock being \$100,000. The company has taken over the properties formerly owned by the Gaddie Coal Co., and has engineers on the ground making surveys for additional improvements. A daily output of 500 tons is aimed at.

Salt Lake City, Utah.—The Utah Coal Sales Agency has been organized under the laws of the State of Utah and after Mar. 1 will handle the output of the Consolidated Fuel Co., Black Hawk Coal Co., Castle Valley Coal Co., and Castle Gate Coal Co. The officers of the company are: W. D. McLean, president and manager; W. O. Bridgman, vice-president; G. E. Forrister, secretary-treasurer; J. H. Mays, director; H. R. Macmillan, director. This is a departure from the established method of handling the sales department of the mines in the Intermountain territory and will be closely watched by the other operators.

INDUSTRIAL NEWS

Halifax, Penn.—The Pett Mountain Coal Co., near Matamoras, has installed a new 10-hp. hoist and engine and a new pump.

Punxsutawney, Penn.—Annie M. Guthrie, of Center Township, sold 174 acres of coal land to the Tide Coal Mining Co. for \$17,500.

Seranton, Penn.—The various collieries of the D. L. & W. Coal Co. were idle Feb. 22, to give their men a holiday on Washington's birthday.

Waynesburg, Penn.—The Enterprise Realty Co. has transferred 600 acres of coal land in Springhill Township to Robert Norris, of Connellsville.

Ravenna, Ohio.—The Hudson Coal Co. has recently purchased a 400-acre tract of coal land at Hopedale. The removal of mine No. 8 will soon commence.

Indiana, Penn.—F. L. Neff and E. I. Berry are opening a coal mine on the John Lydick farm in Cherryhill township, where they own 30 acres of high-grade coal.

Gadsden, Ala.—The North Alabama Iron, Coal & R.R. Co. has received a 200-ton ore crusher. The capacity of the mine will be brought up from 75 to 200 tons a day.

Klee, Ohio.—The Klee coal mine, known as the Brutchey & Eberling Coal Co., will hereafter be known as the Eberling Coal Co. Mr. Eberling has bought out his partner's interest.

Washington, Penn.—A. B. Kirsch, of Nicktown, is optioning many hundreds of acres of coal lands in the vicinity of Bradley. For whom Kirsch is acting no one has any information.

Altoona, Penn.—The mine operated until three years ago by the Ashville Coal & Coke Co., at Ashville, has been reopened under the direction of Clair P. Burtner, with offices in the Altoona Trust Building.

Connellsville, Penn.—Jas. M. Clark has sold to the Washington Coal & Coke Co. 206 acres of coal underlying his farm in Jefferson Township. The price will be about \$200 an acre. The coal is the 9-ft. seam of Pittsburgh coal.

Gary, W. Va.—The United States Coal & Coke Co., a subsidiary of the United States Steel Corporation, has announced a general advance in wages to its employees averaging about 8 per cent., effective Mar. 1. Three thousand men are affected.

Columbus, Ohio—Columbus capitalists headed by Attorney E. D. Howard are negotiating for the purchase of extensive coal rights in Lawrence County, Ohio. The tract comprises about 12,000 acres, and will be developed during the summer if the deal is closed.

Charlestown, W. Va.—Announcement has been made that the coal holdings of the Dixon Pocahontas Fuel Co., together with all the property of the company, has passed by purchase into the hands of the Lake Superior Coal Co. The price paid is said to exceed \$500,000.

Bellefonte, Penn.—The Pennsylvania Coal & Coke Corporation have fired up some 400 coke ovens at its No. 10 mine at Gallitzin. They have been idle for the past week or more for repairs, and these have been finished and all will be put into operation as quickly as possible.

Reynoldsville, Penn.—A coal deal involving over 5000 acres of land was consummated in Perry Township when the Buffalo company bought the Adam Eyler Farm and opened negotiations to secure the surrounding territory. It is believed that an opening will be made in the spring.

Lester, Ark.—The Camden Coal & Clay Co., of Camden, has acquired and will develop 10,000 acres of lignite coal land, and also the clay. The clay will be ground and washed at the mines and shipped to Pittsburgh, Penn., for pottery use. The lignite is a somewhat unmineralized deposit.

Connellsville, Penn.—The Indian Head Coal & Mining Co. began operations Feb. 24 at the two mines just opened at Indian Head. The number will be increased as the workings are developed. Lloyd Reese, of Indian Head, president and general manager of the company, is in charge.

Connellsville, Penn.—The possibilities of large coal deposits as yet untouched in the Ozark regions will be investigated by Eastern capitalists headed by A. D. Vance, of Pittsburgh, who will go to Taney County, Mo., and begin prospecting in the country near Gretna, Branson and Hollister.

Connellsville, Penn.—The Operators' Coal Co., composed of Johnstown men, has taken over the holdings of the Pennsylvania Smokeless Coal Co. in Somerset County. More than 1000 acres near Holsopple changes hands. Two mines, with an output of 1000 tons a day, are being operated.

Columbus, Ohio—Announcements were received here recently that a special meeting of stockholders of the Provident Coal Co. will be held Mar. 20, to vote on increasing the capital stock from \$300,000 to \$600,000, to finance improvements made at the company's property in Belmont County.

Birmingham, Ala.—The Alabama Coal & Coke Co. have sold their mine and coal lands at Waverly, Union County, Ky., on the Illinois Central R.R., to the Drury Coal Co., of Morganfield, Ky., and it is now being operated by A. Mahen Hobson, of Birmingham, Ala., as trustee for the purchaser.

Charleroi, Penn.—The Carnegie Coal Co. is surveying the block of 1400 acres of coal near Hickory, recently bought by them. The work is under the supervision of Engineer Thomas. This is the company that bought the Charleroi Coal Works at Charleroi, which it will operate as soon as a new tipple is built.

Huntington, W. Va.—The management of the Chesapeake & Ohio R.R. expects soon to let a contract for the construction of 3000 seventy-ton coal cars. Half of the 50 locomotives which the company ordered last year have been completed and delivered. The remainder will be finished and delivered within the next two months.

Morgantown, W. Va.—J. A. Comley has sold a tract of Pittsburgh coal along the Buckhannon & Northern R.R. to Pennsylvania men with the understanding that it is to be operated on a royalty basis. The purchasers must mine at least 10,000 tons per acre. The deal involves \$70,000. The mines will be opened at once.

Georgetown, Colo.—The Blue Ridge Mining Co., operating the Millington group of mines on Columbia Mountain, promises to soon have one of the heaviest producing properties in the upper Clear Creek district. A big force of men is being employed, and as fast as ground has been placed in condition more miners will be given work.

Rockwood, Penn.—A syndicate composed of Baltimore capitalists have taken options on about 8000 acres of mineral land lying along the Baltimore & Ohio R.R., one mile west of Rockwood. The operations will then at once be commenced

on a large scale and the mined products will be shipped to the Eastern markets as soon as the syndicate takes over the land.

Indiana, Penn.—What promises to be the biggest coal deal made in this county for 10 years, may be closed on May 1, when a block of 6000 acres of Greene township, which is now under option, may be bought by Philadelphia capitalists. Elmer E. Davis, of Johnstown, representing Philadelphia capitalists, is securing the options. The entire tract lies along Twolick Creek.

St. Louis, Mo.—Interest was aroused in Alton by the announcement that the Clark Brothers syndicate, owning the East Side electric lines and systems in East St. Louis, Alton, Belleville, Edwardsville, Collinsville and Granite City, has organized the East Side Coal Mining Co., and that a site for a power house has been bought by the company from Mrs. Janet Watson at Alton for \$25,000.

Pittsburgh, Penn.—A Pittsburgh coal land broker has sold to the Welsh combine, headed by David Andrew Thomas, 227,000 acres in West Virginia and Kentucky at a price aggregating \$10,000,000. Of this land 175,000 acres are represented as being in the Gauley River district, of West Virginia and 52,000 acres in Belle, Whitely and Knox Counties, Kentucky. The report, as yet, lacks confirmation.

Fairmont, W. Va.—The Mineral Fuel Co. announces that it has purchased between 4500 and 5000 acres of coal land in Letcher County, Ky., and is planning an expenditure of \$500,000 to \$700,000 for development work, including the opening of mines, machinery installation, building houses, and the like, for a modern coal operation with an annual output of something like 750,000 tons. The property was purchased of the Mineral Development Co., and adjoins the 100,000-acre holdings of the Consolidation Coal Co.

Huntington, W. Va.—J. W. Parshall, an agent for Eastern capitalists, who has been inspecting coal and oil lands in West Virginia and Kentucky, expected to close a deal by Mar. 1 for a 50,000-acre tract on New River. It is the intention of this syndicate to build and open up six new collieries on New River before next winter. An expenditure of \$7,000,000 is planned. This sale will mean the opening up of three new towns. Over four thousand workmen and officials will be brought into the state to help in the developing of the first big tract which it is decided to open up.

Barbourville, Ky.—The recently-organized Raccoon Coal Co. has acquired 1200 acres of rich coal land near Hazard, Ky., and will proceed to develop it at once, the daily capacity being estimated at 500 tons. The company intends to install sufficient electrical generating machinery to operate four six-ton motors, four fans and eight machines, as well as four electric rock drills. Machinery bids will be opened about May 1. It is probable that an electric-lighting franchise will be asked for, in order that the company may sell its surplus current.

Wilkes-Barre, Penn.—The Buttertub coal property, in the borough of West Wyoming, has been sold by Messrs. Stark and Kintz to J. D. Davis, of Kingston. No announcement is made as to what company is to acquire possession of the tract. The property consists of about 15 acres, which, according to the account of the mining engineer, carry six veins of coal. The property is bounded on one side by the Mt. Lookout Colliery of the Temple Coal & Iron Co., and on the other side by the Lehigh Valley Coal Co. An opening was made on the property about 25 years ago, but no mining operations have ever been conducted.

Corbin, Ky.—The Louisville & Nashville is planning to double-track that portion of the Cumberland Valley division between Varilla and Corbin, Ky., the latter point being the juncture with the Knoxville division, and the former being the point at which the new Harlan County extension joins the Cumberland Valley division. The cause for the decision to make the improvement is the crowding of the present single track by the increase in coal traffic during the past few years, and the increasing development along the extensions will naturally increase this condition. Work on the additional track, which will be about 35 miles in length, will begin early in the spring.

Louisville, Ky.—At a recent special meeting of the stockholders of the Tennessee-Jellico Coal Corporation, held at the company's office in the Equitable building, in Louisville, it was unanimously decided to increase the capital stock from \$300,000 to \$400,000, for the purpose of providing capital to develop a large tract of coal land recently acquired by the company near Hazard, in the rapidly developing Perry County field. Most of the stockholders are residents of Louisville, the officers being Robert Wedekind, president; L. I. Coleman, vice-president and general manager; John P. Gorman, general superintendent of mines, and W. P. Polk, secretary and treasurer.

COAL TRADE REVIEWS

GENERAL REVIEW

All kinds of prices are being quoted on individual hard coal in anticipation of the April reduction in the company's circular. Few sales are being made, however, only a small volume of coal moving into consumption and this only for the purpose of carrying the consumers over until the reduction goes into effect. The dealers in particular are quite active, endeavoring to dispose of their stocks, but indications are that there will be considerable on hand the first of the month. April, May and June will no doubt see heavy buying for storage purposes, in order to take advantage of the reduced prices in effect and the present inactivity is giving the companies a welcomed opportunity to accumulate surpluses against this impending demand.

The most striking feature in the bituminous market is the evident determination on the part of the larger companies to obtain an advance on next season's contracts, and this, in the face of an unusually adverse market. With the contract season now at hand, the operators are making every effort to get control of the market. Ordinarily prices are high at this season of the year, but now spot quotations are firmly established well below contract asking prices, and as a result consumers are reluctant to close and will not do so until forced.

In the Eastern Coastwise trade concessions are becoming more frequent and there appear to be too large accumulations to permit of any great stability to the market. Comparatively high water-freights are making spot buying slow at some points, and the more competitive contract business has not yet developed. The Pennsylvania grades are dull, but firm. Buyers generally believe there is an abundance of coal and are showing a disposition to buy only as they require the product. In the Pittsburgh district there is some irregularity as to prices due to concessions on the part of the small operators, but the uncertainty about obtaining shipments of these, in time of a heavy demand, makes the buyer hesitate to close with them.

The volume of trade in Ohio is considerably restricted by the higher temperatures, but the price list shows little change. The manufacturing demand is good, but buyers are anticipating cheaper coal in the near future and are confining their orders to immediate requirements. Contracts are being renewed on the same basis as last year. Domestic prices in the Southern market have been advanced 25c. over last year's circular.

The Middle Western mines are running on a still shorter schedule and the demand is so light that there is not even any incentive to reduce prices further. Quotations have, in any event, about reached an irreducible minimum and even, on occasions, run off to below the cost of production. February proved a good month for the Rocky Mountain operators and the higher temperatures prevailing over the first part of the current month indicate a continuance of these favorable conditions.

BOSTON, MASS.

Only a rigid curtailment can improve the present situation on Pocahontas and New River, and it is understood that such a move is in prospect. The \$2.85 price is going hard; the accumulation of coal at Hampton Roads is too great to give any stability to the market. Concessions have been made perhaps more freely the past week than at any time so far this year and if there really is to be a restriction it will be interesting to see how it works. There is apparently little doing on contract; the more competitive business has not yet come into the market to any extent. There is no activity at the distributing points and Southern coals are dull in every quarter. Strike rumors in the New River field will be followed closely in this section and for the spring outlook much will depend on the news that comes from the seat of the threatened troubles.

The high range of water freights, particularly from Hampton Roads, has interfered with the ready absorption of spot coal and will likely make the movement slower still if there is a concerted move to realize the \$2.85 price f.o.b. The Georges Creek shippers seem well supplied with orders. An influx of government steamers at Baltimore has taken up whatever slackness there was.

The Pennsylvania grades are dull but with a fairly firm attitude on the part of most of the operators to net higher

prices than in 1912. There is only a scattering business at tide, and all-rail there are no new features. Buyers feel there is to be an abundance of coal and they are following a hand-to-mouth policy of ordering.

It is "between seasons" on anthracite and all kinds of prices are current on independent coals. As low as \$5, \$5.25 and \$5.50 alongside for egg, stove and chestnut, respectively, have been quoted; in other words the individual shippers are anticipating the expected 50c. reduction in the companies' circular, Apr. 1. Few sales are reported, however, for the dealers are generally loyal to the companies who saw them through the hard season and what cargoes they are taking are largely of the sizes on which there will be no reduction. Individual operators are having difficulty in moving the steam sizes as well as egg and chestnut. This is where the companies with their storage depots here and there have a distinct advantage in dull periods.

The retail price in Boston for bituminous was reduced Mar. 1 from \$5 to \$4.75 per net ton delivered in teams.

Current quotations at wholesale are about as follows:

Clearfields, f.o.b. mine.....	\$1.25@	1.50
Clearfields, f.o.b. Philadelphia.....	2.50@	2.75
Clearfields, f.o.b. New York.....	2.80@	3.05
Cambrias, Somersets, f.o.b. mines.....	1.35@	1.60
Pocahontas, New River, f.o.b. Hampton Roads.....	2.65@	2.70
Pocahontas, New River, on cars Boston.....	3.85@	4.00
Pocahontas, New River, on cars Providence.....	3.75@	3.85

NEW YORK

Bituminous—The soft-coal consumers are still holding off on contracts and the weather has been such that the domestic consumption has been reduced to a minimum with the result that there is little or no demand. Only a small proportion of the contract business has been closed so far this year, but such is not unusual; last year it is believed most of the larger companies closed as many contracts during April as in March.

However, conditions for contracting are particularly unfavorable this season. Last year at this time there was a strong spot market, with prices ruling well above contract asking prices, with the result that consumers were eager to get under cover by closing business. During the current season, the conditions are almost reversed, the spot market being substantially less than contract asking prices, so that consumers will hold off closing until they are absolutely forced to do so. The prospects for obtaining higher prices for next year's contracts are looking more favorable, consumers appearing to have accepted the advance as inevitable particularly on the higher grades.

The larger companies are still curtailing production preferring not to sell at the prevailing low prices in the spot market. The supplies at tide are a trifle low and the car supply is fairly good and much better than last week.

The New York soft-coal market is not quotably changed from last week and continues dull and quiet on the following basis: West Virginia steam, \$2.60@2.65; fair grades, Pennsylvanias, \$2.65@2.70; good grades of Pennsylvanias, \$2.75@2.80; best Miller, Pennsylvania, \$3.05@3.15; Georges Creek, \$3.25@3.30.

Anthracite—While there is some hard coal still moving, the volume is relatively small and confined entirely to the small tonnages required to carry some of the consumers over until the spring discount goes into effect Apr. 1. Shipments of any grades can be had promptly and individuals are offering discounts well down to the spring circular. Such conditions, of course, makes it difficult for the larger companies to maintain circular prices with the result that much of their coal is now being diverted into storage. The operators are now looking forward to a great activity after the first of the month. Consumers of all kinds are working their supplies off down to the lowest possible point in anticipation of the reduced prices, and will be in the market for large tonnages.

We quote the New York market on the following basis:

	Circular	Lehigh	Individual	
			Seranton	Schuykill
Broken.....	\$5.00	\$5.00	.....	.....
Egg.....	5.25	4.55	.....	.....
Stove.....	5.25	4.85	.....	.....
Chestnut.....	5.50	.....	.....	\$4.90
Pea.....	3.50	3.60	.....	.....
Buckwheat.....	2.75	.....	\$2.50	2.15
Ries.....	2.25	.....	2.25	1.80
Barley.....	1.75	.....	.....	1.15

PHILADELPHIA, PENN.

A long continued spell of unseasonable weather, broke here and there by a cold snap, has reduced the market to almost a standstill. There is actually no size at the present time which cannot be furnished at a moment's notice, and orders are promised prompt delivery, without hesitation. Some coal is moving, of course, but the tonnage is comparatively small, and is only to piece out, until the opportunity is presented of buying at the spring or opening prices. The dealers are trying to get rid of what coal they have, so as to carry as little as possible of the high-priced product over into spring; judging from the number of idle men and teams many of them complain about, there may, however, be considerable coal on hand Apr. 1. Some of the most severe snowstorms in this vicinity have occurred during this month, in former years, and the dealers are living in hopes that such will be the case this year.

The demand for the steam sizes, however, continues good, and furnishes the only firm feature of the market. The individual operators are already in the market with April coal, that is, 50c. off the prevailing circular prices, and even less than this it is said. Taking their mid-winter prices of \$5.25@£.50 at the mines, this represents at least as much as \$1.75@2 shrinkage in the value of individual coal. The large companies are still adhering to their circular prices of \$3.75 for egg, \$4 for stove and \$4.15 for chestnut, and what they cannot dispose of at this figure is going into stock, to provide against the heavy demand that is likely to prevail during the months of April, May and June.

Production still continues at top notch, none of the collieries having suspended operations owing to the unfavorable market, and the prevailing dull condition really comes in the shape of a blessing, as it will give them an opportunity to place some coal in stock, which a winter of even normal temperature would have rendered impossible. When it is recalled that most if not all of the companies went into last June with no coal in stock at all, and have had no opportunity until the present to divert any to their storage places, it will place the companies in a much more comfortable position to take care of their spring and summer business.

The bituminous market shows no improvement whatever. Constant production has thrown large quantities of coal on the market, which has to be disposed of, and in most cases, at ruinous prices.

PITTSBURGH, PENN.

Bituminous—It continues to be between seasons as to contract coal, buyers having contracts expiring Apr. 1, being slow to close. There is some irregularity in prices quoted on contracts, due to cutting by small operators, but the large producers are adhering strictly to the regular prices and as supplies are usually somewhat uncertain from the smaller companies, in the event of high prices for prompt coal, the cut prices named are not readily accepted, though occasional sales are made. Demand for prompt coal is not heavy, as the weather has been unusually open for winter, and retail demand is rather light. Slack for early shipment usually brings a premium of 10c., occasionally more, and can be quoted at \$1@1.05. Regular prices are: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; ¾-in., \$1.40; 1¼-in., \$1.55.

Connellsville Coke—The improved prices noted a week ago as having been reached through the stiffening which followed the unloading of considerable stock coke, have been maintained without difficulty, and the present outlook seems to indicate further increases rather than a recession. Demand for prompt furnace coke has not been particularly heavy, but shipments have been larger on contracts and it seems evident that the recession, which began late in January was, as suggested at the time, due simply to a few furnaces working badly temporarily, and to some furnaces starting to consume portions of stock piles accumulated late in the year against the irregularities in shipment, which are usually experienced in the winter, but which were absent this time.

Prompt furnace coke has been held at a minimum of \$2.50, and while demand has been rather small in point of tonnage, the figure has been well maintained. For contract coke, operators have held to higher figures than expected, and in one instance a moderate tonnage was placed at \$2.65, for regular shipments to July 1. There are few operators quoting as low as \$2.50, but the price could probably be done either to July 1 or for second-half. Foundry coke has undergone considerable stiffening. Transactions are now based on standard foundry coke, the foundries no longer purchasing the indifferent grade they were glad to get around holiday time. We quote: Prompt furnace, \$2.50; contract furnace, largely nominal, \$2.50; prompt foundry, \$3@3.25; contract foundry, \$3@3.25, per ton at ovens.

BALTIMORE, MD.

The market underwent no change whatever during the week. The low grades of coal are still being quoted around \$1, but the car situation improved slightly. Operators are still quoting contract prices for the better grades at 10c. to 15c. above last year's level. About two weeks ago, a number of contracts were closed on this basis, but the buyers are inclined to hold off for a while, and are talking of seeking other fields, if the trade insists on the higher prices. The coal men claim that they are entitled to the advance, owing to the increased operating cost.

West Virginia operators were in Baltimore during the week to confer with Baltimore & Ohio officials relative to the suggested change in the car-distribution system prevailing on that system. Many complaints have been made regarding the present distribution, and the railway company is endeavoring to satisfy its shippers. It is thought that some plan will be evolved which will be satisfactory to all concerned. There is some talk of this road building another coal pier at Curtis Bay.

BUFFALO, N. Y.

The weather has spoiled anthracite so completely that it will require a more severe freeze than March is likely to develop, to restore it to its former activity. Sometimes the semiwinter season continues so persistently that there is a fairly good market all through April, but that does not appear to be expected now. February was only a winter month for about two-thirds of the time, and spring is too near for much return of the demand.

Bituminous naturally suffers less from the unseasonable weather than anthracite, but even it is now standing still because of the increased efficiency on the part of the railroads. During the first half of February the roads became badly demoralized and prices were strong in consequence, but now the delayed shipments are coming forward freely and there is plenty of coal being offered. But the soft-coal market is not so weak as the small sales would seem to indicate. The large operators are holding firm, and if the surplus coal on track can be worked off in a short time it is possible that no break of consequence will take place. Still the tendency is to mine more coal than is needed, and if the railroads can move a full output, it is going to be difficult to hold the quotations.

Jobbers, as a rule, refuse to concede of any lower quotations, saying that the extra quietness of the bituminous market does not necessarily indicate weakness. Pittsburgh select lump continues at \$2.80; three-quarter, \$2.65; mine-run, \$2.55, and slack, \$2.15, with Reynoldsville and Allegheny Valley 15c. to 25c. lower. Coke continues to decline. It went too high and, now on the decline, it does not seem to know where to stop. Jobbers find no other reason for its present weakness. Quotations are on the basis of \$5.20 for best Connellsville foundry, with very little stock coke yet to be had. The consumption remains good, or stock piles would mount up.

Anthracite premiums are a thing of the past, and Buffalo has three Lake cargoes made up of surplus large sizes, with more to be loaded right along. So far only the Lehigh Valley company has done any water loading, though the D. L. & W. would begin soon but for the seizure of the water trestle by the government on a charge of trespass.

COLUMBUS, OHIO

During the past week the temperature rose and the demand for domestic grades became less, although the general price list showed only a slight change from the previous week. The volume of trade is considerably restricted and operators believe that there is not much in store for them in the future, unless weather conditions become more favorable.

Operations in most of the Ohio fields have been curtailed because of the weak demand. In the Hocking Valley district it is estimated that the output was only 65 per cent. of the average and the same is reported from Pomeroy Bend district. In Eastern Ohio where the steam trade is more active, the output was about 75 per cent. of normal. In the strictly domestic fields the production was below 50 per cent.

Steam business is as active as could be expected under the circumstances. Manufacturing plants are still taking a fairly large tonnage although they are not stocking up any, believing that cheaper coal will prevail in the future. Quite a few of the steam contracts are expiring about this time and they are being renewed generally at the same figures that prevailed during the past twelve months. In eastern Ohio practically all of the larger fuel contracts are being entered into at a slightly higher figure than last year. Re-

tall stocks are fairly large and as a result orders are not coming in fast from that source. Dealers have not been having much business and they are inclined to pull in and prepare for the summer season.

Quotations in the Ohio Field are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	\$1.50	.....	\$1.50	\$1.45
1-inch.....	1.35	\$1.20	1.35	1.30
Nut.....	1.30	.....	1.30	.....
Mine-run.....	1.15	1.05	1.15	1.15
Nut, pea and slack.....	0.90	.....	0.90	0.90
Coarse slack.....	0.80	0.85	0.80	0.80

CLEVELAND, OHIO

The demand for soft coal continues light and conditions indicate that the production exceeds the consumption. The reduction on slack is most noticeable and prices fell off from 10c. to 15c. per ton.

Wholesale quotations per short ton f.o.b. cars at the mines are as follows:

District.	Freight rate	1-in.lump	Mine-run	Slack
Youghiogheny.....	\$1.00	\$1.40	\$1.30	\$1.00
Pittsburgh No. 8.....	0.90	1.20	1.10	1.00
Goshen No. 6.....	0.70	1.35	1.25	1.10
Coshocton.....	0.70	1.55	1.35	1.15

Pocahontas lump and egg is quoted at \$1.70, run-of-mine \$1.10, slack \$1 f.o.b. mines. Hocking is going at \$1.55; Massillon domestic lump at \$2.50 mines. Furnace coke is quoted at \$2.25 f.o.b. ovens with about 75c. added for the foundry grade.

LOUISVILLE, KY.

The market is swamped with fuel and prices are nearly at an irreducible minimum, yet fail to move the coal. It is said that the quantity of fuel in the principal markets of the South was never before so great at this season of year. The best grades of lump and block are going begging at prices as much as a dollar below normal, and even the steam market is exhibiting astonishing weakness.

Good Eastern Kentucky lump and block has been sold during the past few days as low as \$1.50 a ton; and round can be had at \$1.15 or thereabouts. The better grades of nut and slack are held at 75¢-85¢, with a weak demand, which may presage still lower prices, unless manufacturers realize their opportunity and take advantage of it to lay in a supply against the almost certain scarcity which must follow a dead domestic market. Western Kentucky nut and slack is selling at about 60¢, and pea and slack ranges from 40¢-55¢.

HAMPTON ROADS, VA.

The past week has been a quiet one in the tidewater market and there has been no change in the price of contract or spot coal, which remain around \$2.60 f.o.b. Hampton Roads, for standard New River and Pocahontas coals. The inferior grades are selling as low as \$2.50, while high-volatile coals, of which there is always a small supply on hand, are bringing about \$2.40 to \$2.45. The movement continues good and the coal roads are all receiving new equipment, and placing further orders for still more. Contracts are being made on the basis of \$2.85 f.o.b., but buyers are slow, apparently expecting a break in prices before April, but this is hardly justified by the present outlook.

Considerable talk is heard of the likelihood of a general strike in the West Virginia coal fields, based on the evident intention of the Miners Union to make a determined effort to effect an organization of the miners in these fields, especially in the New River-Pocahontas section; it is quite likely that these efforts will be more successful than ever before, if persisted in.

There are still quite heavy accumulations of coal at the piers and the congested conditions at Newport News continue, although slightly improved, as is shown by the increased dumping. Dumping at Lamberts Point pier for January was 484,343 tons as compared with 482,102 for February; Sewalls Point handled 260,544 tons in January and 258,183 in February; Newport News, 243,571 and 284,706 respectively.

BIRMINGHAM, ALA.

Orders are now being booked by the domestic producers at the new schedule of prices, as follows:

Month	Fancy Lump	3x6-in. Lump
April.....	\$2.50	\$2.00
May.....	2.60	2.10
June.....	2.70	2.20
July.....	2.80	2.30
August.....	2.90	2.40
September.....	3.00	2.50
October.....	3.25	2.75
November.....		
February.....		

Protests are being made by some of the dealers at paying 25c. per ton more than for last season's coal, but this increase is necessary to take care of the advance in miners'

wages and operating costs in general. It is a well known fact that the quantity of high-grade domestic coals in Alabama are more limited than are the steam and coking grades. Many of the domestic mines are already working to a great depth, which accounts for the high cost of mining this grade.

The steam market is approaching the season of the year when a natural decline takes place all along the line and it is not believed that the high prices ruling at this time can be maintained over a long period. Producers of blacksmith coal are enjoying an unusual era of prosperity and prevailing prices are higher than for many years past. Foundry cokes are in good demand and quotations firm. Virginia ovens, however, are shading prices to some extent and a sympathetic weakness may develop in the local market at any time.

INDIANAPOLIS, IND.

The coal situation remains unchanged, with the exception that the mines have been on shorter schedule. The report from Terre Haute is that 3000 miners have been idle and are trusting to a little colder weather that ushered March in, to improve conditions. But the cold spells this winter have, as a rule, been too short to get in good action before mild weather ensued. Prices both at the mines and in the retail yards hold steady, the former being at the bottom. The demand is so poor that there is no incentive for retailers to reduce quotations, so they are holding them at the high level that came in with the beginning of winter. There are some bargains to be picked up by them, but most of them had their winter supply contracted and have had enough trouble to dispose of that, without looking for more.

Steam coal is almost all sold on contract, but those who depend on the open market have had opportunity to get some cheap fuel. Operators are now concerning themselves with renewals for next season. Whether the experiences of retailers the past season will make them backward in entering into similar agreements for the future remains to be seen.

DETROIT, MICH.

Bituminous—With all the large users of steam coal well stocked, and the dealers with a large supply of domestic on hands, both the steam and the domestic markets bring the situation to a standstill. Slack is not strong but should be with the larger sizes as they are; however, the demand is not worrying shippers. The price is slightly affected, but it is predicted it will advance to normal.

Current quotations are as follows:

	W.Va. Splint	Gas	Hock- ing	Cam- bridge	Ohio No. 8	Poca- hontas	Jackson Hill
Domestic lump.....	\$1.50	.....	\$1.60	.....	.....	\$1.75	\$2.00
Egg.....	1.40	.....	1.40	.....	.....	1.75	2.00
1½-in. lump.....	1.25	.....	.....	.....	.....	.....	.....
2-in. lump.....	1.10	\$1.10	1.10	\$1.10	\$1.10	.....	.....
Mine-run.....	1.00	1.00	1.00	1.00	1.00	1.25	.....
Slack.....	1.00	1.00	1.00	1.00	1.00	.....	.....

Anthracite—Demand for anthracite has been falling off until it is down to circular. However the bulk of hard coal for this vicinity is going at \$5.75, for egg and stove and chestnut, \$6 f.o.b. Suspension Bridge.

Coke—There seems to be an increase in demand for this product just at the present time. Connellsville is quoted at \$3.50, Semet Solvay \$4 and gashouse, \$3.75 f.o.b. ovens.

CHICAGO

Dullness prevails in the Chicago coal market; prices, in a measure at least, are at the same level that usually obtains during the summer months. Some operators are selling coal at a loss of 5c. a ton or more.

Six-inch egg has been offered on the local market for shipment direct from the mines on the basis of 85c. and many of the Illinois operators seem willing to dispose of their coal at almost any price. Mines in Franklin County are being operated on about a half-time basis. While the Franklin County operators are adhering to reasonable figures, other companies are slashing prices right and left. The latter have been accepting \$1.25 for high-grade domestic lump, egg and nut and in some instances have scaled the price to \$1.10.

Springfield operators are selling domestic lump for \$1.25 to \$1.35. There has been a good demand for Hocking Valley coal, the price being firm at \$1.50. Smokeless lump and egg ranges in price between \$1.50 and \$1.75. There is little activity in the coke trade.

Prevailing prices in Chicago are:

	Sullivan Co.	Springfield	Clinton	W. Va.
Domestic lump.....	\$2.47	\$2.07 @ 2.22	\$2.27	.....
Egg.....	2.47	.....	.....	\$3.95
Steam lump.....	\$2.12 @ 2.37	1.92 @ 1.97	2.17	.....
Mine-run.....	.....	1.87 @ 1.92	1.97	3.30
Screenings.....	1.67 @ 1.72	1.57 @ 1.62	1.67	.....

Prevailing prices for coke are: Connellsville and Wise County, \$5.75@6; byproduct, egg, stove and nut, \$5.50; gas house, \$5.50.

ST. LOUIS, MO.

Weather conditions have been more favorable to the coal men the past week than for over a month, but it was not of sufficient strength to create any market. Movement of coal for Northern points picked up some, but the local demand showed but a slight increase. The operators have settled down with the knowledge that there will be nothing more doing now until next fall, and many of the mines are making arrangements to shut down for several months.

For the last week or ten days coke has been a drag on the market, and the demand for smokeless coal has dropped off wonderfully. It has been actually hard to give away, at the circular or under, the different sizes of anthracite. The St. Louis coal market was perhaps never in a more deplorable condition at this season of the year than it is at the present time.

The circular prices are:

	Cartersville and Franklin Co.	Trenton and Big Muddy	Mt. Olive	Standard
2-in. lump.....				\$0.85 @ 0.90
3-in. lump.....			\$1.15	
6-in. lump.....	\$1.20 @ 1.25		1.25	1.00 @ 1.10
Lump and egg.....	1.25	\$2.25		
No. 1 nut.....	1.10 @ 1.20			
Screenings.....	0.85 @ 0.90			0.60 @ 0.65
Mine-run.....	1.05 @ 1.20			0.80
No. 1 washed nut.....	1.35 @ 1.40			
No. 2 washed nut.....	1.25 @ 1.30			
No. 3 washed nut.....	1.20 @ 1.25			
No. 4 washed nut.....	1.15 @ 1.20			
No. 5 washed nut.....	1.00 @ 1.05			

MINNEAPOLIS-ST. PAUL

There are no new phases in the Northwestern trade at the present time. While the weather of the past two weeks has stimulated a few orders they have been few and far between. There has been so much free coal on track in this territory that few orders go direct to the mines. The Twin Cities during the past two months have been made a regular dumping ground for surplus tonnages and this has had a demoralizing effect on the market; in many cases such coal has been sold for the freight.

OGDEN, UTAH

February has been a good month both for the operator and dealers. In the early part of the month shipments were decreased slightly, due probably to the fact that most dealers anticipated warmer weather, but this condition did not prevail and orders were freely placed for additional shipments the month finishing quite strong. Conditions in Nebraska and Kansas have not improved and consignments to that territory are at a low point. A general storm with lowering temperatures is now visiting these two states and if of any duration, should relieve the situation to some extent.

California is experiencing some wet weather and the Utah mines report good shipments to that territory; however, the prices for that market have been lowered to: Lump and nut, \$2.50, effective Mar. 1.

Quotations throughout the balance of the territory remain unchanged as follows: Wyoming lump, \$2.75; nut, \$2.25; mine-run, \$1.85; slack, \$1; Utah lump, \$2.75; mine-run, \$1.85; slack, \$1.25.

PORTLAND, ORE.

The cold weather is practically over for the winter and signs of spring have already appeared in the Pacific Northwest, particularly along the coast where the weather is seldom severe, although the temperature is low enough to create a good demand for fuel. Coal dealers here expect no changes in the market situation till next July when summer prices will undoubtedly be made upon the strength of concessions from the mines.

PRODUCTION AND TRANSPORTATION STATISTICS

PENNSYLVANIA RAILROAD

Statement of coal and coke carried on the P. R.R. Co.'s lines east of Pittsburgh and Erie during last December and January, with the increase or decrease over the same period last year, in short tons:

	December	Difference	January	Difference
Anthracite.....	1,036,717	- 178,088	1,014,259	- 26,276
Bituminous.....	4,271,702	+ 290,216	4,210,196	+ 628,831
Coke.....	1,242,882	+ 331,911	1,288,514	+ 347,583
Total.....	6,551,301	+ 444,039	6,512,969	+ 950,138

VIRGINIAN RAILWAY

Total shipments of coal over this road for January of the current year were 453,886 tons as compared with 317,405 tons for the month previous.

BALTIMORE & OHIO R.R.

Coal tonnage moved over the B. & O. and affiliated lines during January of the current year was 3,003,404, as compared with 2,443,528, for the same month last year; coke tonnages for the same months were 439,176 and 329,556, respectively, making gross of 3,442,580 tons for 1913, as compared with 2,773,084 in 1912.

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for the years 1910-11-12, and for December of 1911-12, in long tons:

	Year			December	
Imports from:	1910	1911	1912	1911	1912
United Kingdom..	13,124	9,278	8,697	988	2,403
Canada.....	1,675,692	980,174	1,404,139	106,909	109,723
Japan.....	56,278	16,031	30,621	4,658	4,958
Japan.....	240,899	232,969	162,671	25,024	10,743
Australia & Tasmania.....					
Other countries...	5,950	356	2,222	1	20
Total.....	1,991,943	1,238,808	1,608,350	137,580	127,847
Exports:					
Anthracite.....	3,021,627	3,553,999	3,688,789	241,244	283,831
Bituminous,					
Canada.....	7,567,297	10,609,587	10,433,010	691,847	594,309
Mexico.....	497,316	496,830	462,659	45,087	39,332
Cuba.....	675,980	470,674	302,487	21,003	33,480
West Indies.....	858,776	1,053,703	1,152,004	112,199	118,784
Canada.....	487,519	565,882	650,617	54,214	48,211
Other countries...	697,351	682,138	1,459,201	74,062	76,109
Total.....	10,784,239	13,878,754	14,459,978	998,412	910,225
Bunker coal.....	6,445,593	6,667,338	7,340,100	548,844	578,667

FOREIGN MARKETS

GREAT BRITAIN

Feb. 21—Prompt business is difficult to arrange, owing to congestion at the docks. Colliery owners are adopting a very firm attitude forward, in anticipation of high pressure being maintained until after Easter. Small coals are very scarce and dear. Prices are approximately as follows:

Best Welsh steam.....	\$4.44@4.56	Best Monmouthshires..	\$4.14@4.20
Best seconds.....	4.32@4.38	Seconds.....	3.96@4.02
Seconds.....	4.20@4.32	Best Cardiff smalls.....	3.72@3.84
Best dry coals.....	4.20@4.44	Seconds.....	3.36@3.60

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days—less 2½%.

British Exports—The following is a comparative statement of British exports for December and January of the last two years, in long tons:

	December		January	
	1911	1912	1912	1913
Anthracite.....	221,359	230,803	241,924	298,308
Steam.....	4,255,301	4,210,902	3,945,278	4,417,993
Gas.....	910,050	829,435	827,198	901,364
Household.....	166,491	141,763	139,679	145,726
Other sorts.....	240,710	284,447	267,096	306,927
Total.....	5,793,911	5,697,368	5,421,175	6,070,318
Coke.....	115,956	97,409	113,871	107,095
Manufactured fuel.....	103,912	171,400	148,932	196,739
Grand total.....	6,040,770	5,966,177	5,683,978	6,374,152

BELGIUM IMPORTS AND EXPORTS

The following is a comparative statement of the imports and exports from Belgium for January, 1912-13:

	Imports		Exports	
	1912	1913	1912	1913
Coal.....	722,495	693,923	364,161	396,366
Coke.....	73,963	114,188	75,509	8,4080
Briquettes.....	31,756	40,446	38,228	40,641

FRENCH PRODUCTION IN 1912

Coal production of the Pas-de-Calais and Nord basins for the year 1912 was 29,888,015 tons, as compared with 28,152,993 in 1911. Coke production for the same periods was 2,443,442 and 2,328,715 tons, respectively.

FINANCIAL DEPARTMENT

Monongahela River Consolidated Coal and Coke Co.

President John A. Donaldson, under date of Jan. 15, reports, in part, for the fiscal year ended Oct. 31, 1912, as follows:

Trade improvement in the fiscal year balanced the special difficulties. The river was frozen up for 48 days during January and February, no loading being done at the river tipples, and there was an entire suspension of all operations during April in negotiating a labor wage scale, which together materially decreased production and lessened profits from the transportation department; but both were offset by an unusual demand during the lake shipping season and a betterment in prices.

Four steamers and one tug being out of commission, entirely dismantled, and valued on the books at \$142,452, with a depreciation fund of only \$50,753 to the credit of the account, left a balance of \$91,699 unprovided for. It was decided as an equitable disposition of such balance to charge one-half, or \$45,849, against the profits of the fiscal year just ended, and the other half against undivided earnings account, for the reason that some of these boats have been out of commission for several years. Adjustment of the active river craft equipment net book value to its present trade worth is being considered.

COAL ACREAGE PURCHASED TO DATE, MINED OUT AND SOLD—REMAINDER

	Orig. Purchased	Since 1899	Total	Mined Out	Balance
Pennsylvania.....	33,075	6,551	39,626	22,754	16,872
Kentucky.....	2,119	558	2,677	242	2,435

[A reserve fund of \$100,000 each has been created to provide for future loss by fire and sinkage.

Bonds have been redeemed and canceled during the year amounting to \$214,000. Certificates of indebtedness have been redeemed during the year amounting to \$145,000.]

EARNINGS, ETC., FOR YEARS ENDING OCT. 31

	1911—12	1910—11	1909—10	1908—09
Coal mined (tons).....	27,910,300	7,509,413	7,637,553	5,947,826
Ohio Valley Coal & Mining Co., additional tons....	157,602	122,641	117,591	84,566
Earnings.....	\$2,628,843	\$2,258,456	\$2,117,960	\$2,134,587
Less—				
Maint. & rep. river craft....	474,654	436,965	422,740	405,548
Depreciation charged off....	954,788	913,099	937,426	834,927
Interest on bonds, etc.....	490,863	506,753	526,571	560,858
Loss by storm Sept. 20, 1909.				*709,410
Div. on pref. stock.....	(7%) 700,000	(4) 400,000	(2) 200,000	.....
Total.....	\$2,620,305	\$2,256,817	\$2,086,737	\$2,510,743
Net balance for year.....	sur.\$8,539	sur.\$1,639	sur.\$31,223	def.\$376,154

* Loss on coal, river craft and harbor equipment sunk during storm on lower Mississippi River. y Depreciation, \$954,788 in 1911-12, includes depreciation on mine equipment, \$254,549; depreciation on river craft, etc., \$354,527; depletion of coal acreage, \$299,863, and one-half book value of certain steamboats worn out and dismantled, \$45,849.

BALANCE SHEET OCT. 31

Assets—	1912	1911	Liabilities—	1912	1911
Cash on hand, etc.....	\$269,579	\$461,029	Preferred stock..	10,000,000	10,000,000
Reinvestment fund with trustee.....	8,614,529	8,240,597	Common stock..	20,000,000	20,000,000
Bond sinking fund.....	260,039	248,118	Bonds.....	7,342,000	7,538,000
Bonds purchased.....	143,554	143,554	Certificates of indebtedness..	890,000	1,035,000
Accts. and bills rec., etc.....	2,859,748	2,821,946	Bond premium res'v'e.....	50,690	126,950
Stocks and bds. oth. cor.....	352,029	454,883	Mortgages.....	.....	5,319
Def. chgs. agst. oper.....	90,728	11,679	Accounts and bills payable..	1,899,906	2,649,633
Coal on hand.....	1,236,437	1,429,039	Fire insur. fund..	100,000	100,000
Supplies on hand	395,146	260,890	Coal sinking fund.....	100,000	100,000
Lumber, &c. sup.	185,020	185,594	Undivided profits	1,596,104	1,587,564
Empty coal boats.....	245,461	289,957			
Investments.....	27,901,984	28,595,190			
Total.....	42,410,700	43,142,466	Total.....	42,410,700	43,142,466

There was an increase of 14% in tonnage sales of steel, yet as most of the smaller products, representing about 30% of

total output, were sold at generally lower prices, there was not a corresponding gain in steel department earnings, though the ratio of increase in gross was maintained in the net earnings.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending March 1:

Stocks	Week's Range			Year's Range	
	High	Low	Last	High	Low
American Coal Products.....	91½	91½	91½	94	94
American Coal Products Pref.....	.....	.....	109½	109½	109½
Colorado Fuel & Iron.....	34½	31½	33½	41½	31
Colorado Fuel & Iron Pref.....	.....	.....	155	155	150
Consolidation Coal of Maryland.....	102½	102½	102½	102½	102½
Island Creek Coal Pref.....	86	85	85	.....	.....
Lehigh Valley Coal Sales.....	240	204	204	.....	.....
Pittsburgh Coal.....	22	19½	21½	24½	19½
Pittsburgh Coal Pref.....	88	84½	87½	95	84
Pond Creek.....	23½	22	23½	28½	22
Reading.....	158½	153½	156½	168½	153½
Reading 1st Pref.....	90½	89½	90	91½	89½
Reading 2nd Pref.....	90	87½	90	93	87½
Virginia Iron, Coal & Coke.....	50	44½	50	54	44½
Bonds	Closing Bid Asked		Week's Range or Last Sale		Year's Range
Colo. F. & I. gen. s.f.g. 5s.....	99	100	99	Feb. '13	98 99½
Colo. F. & I. gen. 6s.....	.....	.....	107½	June '12	.....
Col. Ind. 1st & coll. 5s. gu.....	81½	82	81½	82	81½ 85
Cons. Ind. Coal Me. 1st 5s.....	.....	.....	94	93	June '11
Cons. Coal 1st and ref. 5s.....	.....	.....	98	Oct. '12	.....
Gr. Riv. Coal & C. 1st g. 6s.....	96	102½	102½	Apr. '06	.....
K. & H. C. & C. 1st s.f.g. 5s.....	.....	.....	98	Jan. '13	98 98
Pocah. Con. Coll. 1st s.f. 5s.....	87½	88	87½	Feb. '13	87½ 87½
St. L. Rky. Mt. & Pac. 1st 5s.....	76½	77½	76½	Feb. '13	76½ 80
Tenn. Coal gen. 5s.....	100½	Sale	100½	100½	100½ 103
Birm. Div. 1st consol. 6s.....	101	103½	102½	Feb. '13	102½ 103
Tenn. Div. 1st g. 6s.....	101	103½	102	102	102 102
Cah. C. M. Co. 1st g. 6s.....	.....	.....	110	Jan. '09	.....
Utah Fuel 1st g. 5s.....	.....	.....	79½	79½	79½ 79½
Victor Fuel 1st s.f. 5s.....	.....	.....	79½	79½	79½ 79½
Va. I. Coal & Coke 1st g. 5s.....	96½	97½	97½	Feb. '13	96½ 98

No Important Dividends were announced during the week.

••

The Rock Island R.R. Co.—This corporation owns stock in coal companies as follows: Coal Valley Mining Co., \$50,000; Consolidated Indiana Coal Co., \$2,400,000; Crawford County Mining Co., \$100,000; Dering Coal Co., \$1,700,000.

Burns Bros.—The recently formed consolidation under this name will have net tangible assets after depreciation allowance of \$2,407,309. This figure includes only the salvage value of equipment carried at \$269,000, and which is appraised at \$1,029,100, the difference, \$760,000, having been transferred to the item good will, leases and contracts.

Pittsburgh Coal Co.—This company was incorporated in New Jersey, September, 1899. It owns about 150 coal mines and 100,000 acres of coal land in or within a radius of 40 miles of Pittsburgh, together with 5000 coal cars, operating over railroads radiating from Pittsburgh. Dividends paid were: On preferred, 1900 to April, 1905, 7% yearly; 1906 to 1909, none; 1910, 1911 and 1912, 5 per cent.

Reading Co.—In 1896 this corporation was bankrupt, but in the past decade it has expended from income, on additions and betterments, an amount equal to 45% of its \$70,000,000 common stock. This is at the rate of \$3,150,000, or 4½% per annum. For the fiscal year ended June 30, 1912, this expenditure was \$3,469,482, and had this not been charged to income, the common dividend would have amounted to 12½% for the fiscal year.

Jefferson & Clearfield Coal & Iron Co.—This company was organized under the laws of Pennsylvania in May, 1896. The maximum production per year so far was 2,595,161 tons. The \$1,500,000 common and \$300,000 of the \$1,500,000 of 5 per cent. noncumulative preferred stock is owned by the Rochester & Pittsburg Coal & Iron Co. On the common stock 5 per cent. was paid in 1900, nothing in 1901, 5 per cent. per annum during 1902 to 1905, since which date nothing further has been paid. On the preferred stock 5 per cent. per annum has been paid regularly since August, 1897.

PRICES OF MINING SUPPLIES

MARKETS IN GENERAL

Business did not improve during February, either in the volume of orders, or in sentiment. The distinct feeling of unrest which was discernible a month ago continues, and the most disquieting thing about it is that it is as prevalent in the agricultural region as in eastern cities. Business men seem to be afraid of a number of different things, which in all probability will pass away without leaving any mark on affairs.

The continual drawing of gold from the United States to Europe must soon have a serious effect on interest rates and money conditions here. The continent of Europe has been hoarding currency, and in as large amount as was laid away in the United States during the money panic of 1907.

The continued unrest in the Balkan States and an outbreak of a revolution in Mexico have not been favorable factors in business.

The steel market is barely holding its own. Prices have shown practically no change, but the demand is falling off. This is not at all serious, and the unfilled orders of the U. S. Steel Corporation decreased less than 2% in the month of January. Since that time, too, there has been an almost unheard of amount of buying by the railways of cars, locomotives and all kinds of materials. Those conversant with the situation appear to think that the railways will secure their desired increase in rates some time this year.

Labor conditions are not especially unsatisfactory, although there are a number of strikes reported, including a rather serious one among the carbuilders on the railways. The fact that the firemen on the railroads and the railway managers have reached an agreement regarding the arbitration removes this danger, and at one time it was a serious question whether or not a strike could be averted.

Continued activity is noted in shipbuilding work. Several new vessels have been laid down, or plans prepared during the last month, and the activity continues as great as ever.

LABOR

The defeat of the attempt to pass the Immigration Bill over the veto of the President is one of the most important topics which has confronted the labor world for some time. While it may be granted that a stricter supervision is needed of some of the immigrants coming into the country, it does not mean, by any stretch of imagination, that we are to put up barriers against all comers except those who can pass an elaborate educational test. What the country needs is the best kind of workers it can obtain, workers who are capable of wielding a pick and shovel, without any pretension as to educational fitness.

The threatened strike of the firemen on the railways was averted at, almost the last moment. Some hold the opinion that it would have been better to have had a strike at this time, fighting it out once and for all, and thrashing the matter out regarding higher freight rates and the like, even if it did stop business, and cause discomfort to thousands of disinterested people. It is a test of the Erdman Act which may go a long way toward its further use in industrial dissensions, or result in a modification of the bill to make it more applicable to all kinds of disputes. As the railway managers claim, it does put an enormous responsibility on the third arbitrator.

Unrest continues among the garment workers in New York, one result of which has been the establishment of factories outside of New York City. On the Lehigh Valley, men employed in the car building and repair shops are striking in Buffalo, and there is a threat to carry the trouble all along the line.

IRON AND STEEL PRODUCTS

Continued activity in the purchase of rolling stock, rails and track fastenings by the railroads, has been the interesting feature of the market during the month. The railroads have been just as active buyers as they were during the last month of 1912, and, had general mercantile consumers purchased as freely as they did then, the tonnage disposed of would have been as large, if not larger, than at any other time in the last year. As it was, the early estimates regarding the total booking of steel orders during February were

revised more than once during the month, and while it is probable that some diminution will be shown in the volume of orders on the books of the leading steel company, these will be by no means as large as was first expected. The fact that orders fell off less than 2% in January, is sufficient reason to believe that the present activities in steel production will continue for the next six months, at least.

Building operations were larger in January than last year, and, outside of New York, indications are that they will continue just as large as during 1912. Manufacturing concerns are making some additions and extensions to plants, but these are by no means as numerous as they were last year.

The decline in coke has affected sentiment, and a further weakening in the price of foundry iron in Birmingham has had a depressing effect on consumers who ordinarily purchased in that market. There has been very little pig iron sold for forward delivery during the last month.

Iron trade conditions in Europe are not as satisfactory as they were, and, in Germany especially, prices are only maintained through the operation of a strong syndicate. It is probable that there will be more active competition for export orders this year than last.

The scrap market shows an improvement in the West, but in the Pittsburgh district there is a continued falling off in the number of new orders, and prices have likewise declined.

Rails—A significant feature of the buying of rails this month has been the comparatively large number of orders, all of them for small lots. Big railway companies have purchased freely, and these purchases are much earlier than usual. More activity is noted in light rails than in any other branch of trade, and there is considerable delay in making shipments.

Quotations continue unchanged as follows: Standard sections, 50 to 100 lb. per yd., 1.25c. per lb.; 40 to 50 lb., 1.21c.; 12 lb., 1.25c. Relaying rails in Chicago of standard sections are held at \$24 per ton.

Track Supplies—Specifications on contracts are heavy for all kinds of track supplies, but spikes seem to be in especially large requisition. The Great Northern recently ordered 15,000 kegs of spikes; the Pennsylvania is taking as many spikes as can be sent it by the two mills making special kinds used by this railroad, and other railroads are having difficulty in securing the materials needed.

Prices of spikes are \$1.90 to \$2 for small lots, but for prompt delivery, as high as \$2.25 has been paid in Pittsburgh. In Chicago, prices are \$1.95 to \$2.05; track bolts with square nuts, \$2.30 to \$2.40; angle bars, \$1.50. These quotations are per 100 lb. An especially heavy demand is noted for tie plates, and probably more have been sold this year than ever before. Quotations are from \$32 to \$34.50 per net ton.

Structural Materials—The market is considerably better than for several weeks past, and quite a little new work is cropping up, especially in the West. Most of this is for small jobs, although an order for 15,000 tons of merchant shapes for the Newport News Shipbuilding Co. has been taken and some enormous orders have been placed for cars. There is a prospect that contracts for the operation of the new subways in New York will be signed this week which will call for a great deal of structural material. The trade has been expecting these contracts for a long time.

Much plate work is being taken for water supply, as well as for cars and shipbuilding work. Prices for structural shapes are unchanged at 1.50 to 1.55c. Pittsburgh, for future delivery, and 1.75 for prompt. In Chicago, quotations for future shipment are made at 1.58 to 1.78c., while prompt delivery commands 1.88 to 1.93c. Plates are held at 1.55 to 1.60c. Pittsburgh, for future delivery, and 1.75 to 1.80c. for fairly prompt. In Chicago, plates are 1.68 to 1.73c. on contract, and 1.88 to 1.93c. for nearby shipments. These are base prices, and small sizes are held at advances above this quotation. All quotations are per 100 lb.

Pipe—Business continued just as heavy during February as in January. Some large orders have been received from Canada where a great deal of work is going on in natural gas fields. For the smaller sizes of pipe, the demand is not quite as active as a month ago.

Discounts continue unchanged as follows: Steel pipe, 1½-in., in large lots from mill, black, 77%; galvanized, 66%; ¾ to 2-in. black, 80%; galvanized, 70½%; 2½- to 6-in. black, 79%; galvanized, 70½%.

Based on these discounts, the net prices of pipe are as follows in carload lots, f.o.b. Pittsburgh:

Size, inches	Cents	
	Black	Galvanized
¾	2.30	3.40
1	3.40	4.85
1¼	4.60	6.55
1½	5.50	7.70
2	7.40	10.30
2½	11.50	16.70
3	15.40	21.75

Sheets—Business offered the mills for third-quarter delivery at present prices has been refused, and many jobbers would be willing to place orders for such shipments, provided they would be accepted at these quotations. Activity continues, and many orders are being received for delivery during the first half of the year, yet there are only a few mills that can spare any tonnage for delivery before July. On the ordinary grade of black and galvanized sheets, mills are from twelve to fourteen weeks behind in shipments.

Should the general steel business improve, there seems to be little doubt that prices will be advanced from \$1 to \$2 per ton later in the year. The following table gives the price of sheets in Pittsburgh, and likewise in Chicago:

	Cents per pound			
	Pittsburgh		Chicago	
	Black	Galv.	Black	Galv.
Nos. 22 to 24	2.20	2.90	2.65	3.60
Nos. 25 and 26	2.25	3.10	2.70	3.65
No. 27	2.70	3.25	2.75	3.90
No. 28	2.75	3.40	2.90	4.15

WIRE PRODUCTS

Wire—Business continues active, with more orders being received than is usual at this time of year. One mill has advanced its quotation on wire nails, but other mills have not followed. Quotations are unchanged, painted barbed wire in Pittsburgh being held at \$1.75, and galvanized at \$2.15. Annealed fence wire in carload lots is \$1.55 and galvanized in \$1.05. In Chicago, annealed fence wire is \$1.73; galvanized, \$2.13, while barbed wire in that market is \$1.93 and galvanized \$2.33. All of these quotations are per 100 lb.

Wire Rope—Prices are without change, 2-in. rope being held in Pittsburgh at 57c. per ft.; 1½-in., 23c.; ¾-in., 10c. These quotations are the minimum for large lots, and for the better grades, higher quotations are demanded.

Telegraph Wire—Prices are without change for lots of fair size. Measured in Birmingham Wire Gage, the prices in cents per lb. are as follows: "Extrat Best," Nos. 6 to 9, 4¾c.; Nos. 10 to 11, 4½c.; No. 1, 4¾c.; No. 14, 5½c.; "Best," Nos. 6 to 9, 3½c.; Nos. 10 and 11, 3¾c.; No. 12, 3½c.; No. 14, 4c. Actual freight is allowed from Trenton, N. J., where it does not exceed 25c. per 100 lb.

Copper Wire—As a result of the steady decline in copper metal, the prices of wire declined, almost, day by day. The base price now quoted is 16c.

MISCELLANEOUS

Bar Iron and Steel—Prices are unchanged from last month, and quotations from jobber's store, either New York or Chicago, are as follows:

Refined iron:		Per lb.
1 to 1½ in., round and square	2.15c.	
1½ to 4 in. x ¾ to 1 in.	2.15c.	
1½ to 4 in. x ¼ in. to ½ in.	2.35c.	
Norway bars	3.60c.	
Soft steel:		
¾ to 3 in., round and square	2.10c.	
1 to 6 in. x ¾ to 1 in.	2.10c.	
1 to 6 in. x ¼ and ½ in.	2.25c.	
Rods—¾ and 1 in.	2.20c.	
Bands—1½ to 6 x ½ in. to No. 8	2.40c.	
Beams and channels—3 to 15 in.	2.25c.	

Nails—The demand is not as heavy as a month ago, but is as large as usual for this time of year. Stocks are not large, as manufacturers of nails who make other wire products are devoting as much raw material as possible to other lines which are more profitable. Quotations are unchanged as follows: Large lots of carloads and over are \$1.75 Pittsburgh. In Chicago, carload lots are \$1.98; less than carload lots \$2.03. In New York, wire nails from store are \$2.05. Cut nails are \$1.70 to 1.75, Pittsburgh, and \$2.05, New York. All of these quotations are per 100 lb.

Packing—There is more demand for packing than a month ago, and quotations are as follows: Asbestos wick and rope, 13c.; sheet rubber, 11 to 13c.; pure gum rubber, 40 to 45c.; red sheet packing, 40 to 50; cotton packing 16 to 25c.; Russian packing, 9 to 10c.

Brattice Cloth—Prices are higher than last month and no relief appears to be in sight before the end of the summer at least. The mills are now quoting on April, May and June shipments which, of course, means late arrivals. The deliveries are still delayed. Despite the usual February dullness, the volume of business seems normal.

Chain—Prices of chain are firm, but the buying has not been especially large. Ruling quotations per 100 lb., f.o.b. Pittsburgh, are as follows:

¾ in.	\$7.50
1 in.	4.95
1¼ in.	3.95
1½ in.	3.40
1¾ in.	3.20
2 in.	3.00
2½ in.	2.90
3 in.	2.80
3½ in.	2.70
4 in.	2.60

Extras for BB

¾ in.	1.50
1 in.	1.50
1¼ in. and larger	1.25

Extras for BBB

¾ in.	2c.
1 in. and larger	1.75c.

Portland Cement—The market is especially firm, and some manufacturers in New York State are securing as much as \$1.10 per bbl. in bulk at the mills. The greater part of the business transacted for mills in the Lehigh Valley district is at 90c. per bbl., but some few sales have been made around 95c. Quotations in Pittsburgh and New York delivered are \$1.58 per bbl. with an allowance of 40c. for the bags returned. These are for shipments in cloth bags.

Manufacturers of cement are especially optimistic over the situation, and believe that the present year will be make a new record in the matter of shipments and are also of the opinion that prices may work somewhat higher as the season advances.

Bars, Concrete Reinforcing—The demand has not been as active in the last month as previously, and some of the largest interests are refusing to sell bars beyond July 1, at the quotation of \$1.50 Pittsburgh. The supply from warehouse stock is somewhat better than a month ago, and likewise mill shipments are being made a trifle more promptly.

PITTSBURGH PRICES IN CENTS PER POUND

	Mill Shipments	Warehouse Stock
¾ in.	1.50 @ 1.55	2.00 @ 2.10
1 in.	1.55 @ 1.60	2.05 @ 2.15
1¼ in.	1.60 @ 1.70	2.10 @ 2.20
1½ in.	1.70 @ 1.80	2.25 @ 2.35

Triangular Mesh—Business is active, but producers are able to ship promptly on receipt of orders. Stocks are very fair, and a large production is looked for this year.

From mill in De Kalb, Ill., quotations are 18c. per 100 lb. higher. Prices are as follows per 100 sq.ft., f.o.b. Pittsburgh district, for less than carload lots and lots of more than 10,000 sq.ft.:

No. 3	\$1.23	No. 32	\$2.62
No. 23	2.05	No. 36	1.05
No. 26	1.42	No. 40	3.25
No. 28	1.97	No. 41	2.48

THE MULE MARKET

Mules—The demand for mules in Kentucky and Tennessee is reported to be active. Two-year-olds have sold recently at Danville, Ky., at from \$120 to \$150 per head. Buyers in the Lancaster, Ky., market have paid from \$175 to \$215, while several excellent pairs have sold at \$550. Four hundred mules were sold at Mt. Sterling, Ky., recently, at from \$200 to \$350 per head. A large lot of three-year-old mules sold in Danville recently brought \$160 per head. Prices in the Paris, Ky., market range from \$200 to \$225. Five hundred mules disposed of at a recent sale at Franklin, Ky., brought prices ranging from \$125 to \$250. Fancy prices are being quoted in some of the Tennessee markets. At Lawrenceburg, pairs are selling at as high as \$600. Lynchburg, which, with Columbia, takes rank as the leading mule market of Tennessee, has shipped over 1800 mules this season. Some unusually high prices have been paid for the fancy stock offered there, the record price of \$900 being paid for a single pair recently. The average is about \$275 per head. Two pairs of two-year-olds sold recently for \$1025. A Louisville, Ky., mule firm recently purchased three carloads of mules in Hardin County, Ky., at \$250 a head.